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(Fraser Canyon near Lytton, British Columbia, where it joins the Fraser Canyon. A Canadian National Railways train crawling along the steep bank, and also [illegible] line from snow avalanches. The view is taken from the Trans Canada Highway. *National Film Board of Canada.*)

MODERN GEOGRAPHY SERIES

BOOK IV

NORTH AMERICA

BY

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FORMERLY GEOGRAPHY AND SIXTH FORM MASTER
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PREFACE

North America is the fourth of a series of volumes, issued under the general title "Modern Geography", and meets the needs of pupils preparing for the General Certificate of Education at the Ordinary Level, and other examinations of similar standard.

The first chapters are devoted to descriptions of the more general features of the geography of the continent as a whole. In the remaining chapters emphasis is laid on the regional aspects, and an attempt has been made to keep a balance between physical, human, and economic considerations.

As in the other volumes, the numerous maps and pictures should prove to be a valuable and attractive feature of the book; many of them will provide material for discussion. We are greatly indebted to all those who have provided photographs; due acknowledgment is made below each illustration.

For this edition the text has been revised, Chapter XXXI has been somewhat enlarged, and the latest available data included. The population figures for the largest cities include the metropolitan areas around them.

Following the present Meteorological Office procedure, Centigrade has been adopted as the definitive scale, but Fahrenheit equivalents have been included in both text and diagrams. The notation "12 C.°", etc., has been used when referring to a *range* of 12 Centigrade degrees, to distinguish this from an actual temperature of 12° C.

A. W. C.
M. E. T.

CONTENTS

MAPS AND DIAGRAMS

DIAGRAMS PAGE

ILLUSTRATIONS

NORTH AMERICA

CHAPTER I

INTRODUCTORY

Discovery, Exploration and Early Settlement

America was discovered by the Vikings as early as the tenth century and settlements were made later along the coasts of Labrador and Hudson Bay, but they were not permanent. It was not until Columbus had sailed to the "Indies" in 1492, believing that he had reached eastern Asia, that serious voyages of exploration began.

In 1497, Henry VII sent an English expedition under the leadership of John Cabot which reached the shores of Newfoundland and the adjacent mainland. In the same year Amerigo Vespucci is reported to have reached the new world and it was from this explorer that the continent derived its name. Thirty-seven years later Jacques Cartier sailed up the St Lawrence River and opened up Canada for the French. In 1608 Champlain founded Quebec and Norman colonists settled in the St Lawrence Valley and in Nova Scotia. French explorers then began to penetrate beyond the Great Lakes and down the River Mississippi to the Gulf of Mexico. New Orleans still retains many characteristics of a French town. For the most part the French were traders in search of furs, and their relations with the native Indians who inhabited the country were usually friendly. Numerous French names round the Great Lakes and in the Mississippi valley bear witness to their penetration. French is still spoken by about 90 per cent. of the Canadians in Quebec.

Meanwhile the English had established a colony at Jamestown, Virginia (1607), and the puritan colonisation of the north-east coast followed. Thirteen English colonies were established on the Atlantic seaboard but hostile Indians and the mountain barrier of the Appalachians made penetration to the interior very difficult.

The Dutch had small settlements on the east coast and were the founders of New Amsterdam, which was ceded to the British in 1664 and renamed New York.

While the French and British were settling in the north and east, Spaniards spread over the south and south-west of North America in search of precious metals which they had seen in Indian ornaments. They claimed the West Indies, overcame the Aztecs of Mexico, and their influence can be seen in the numerous Spanish names of towns, rivers, and states in Mexico and southern U.S.A. Spanish architecture still exists in churches and missions and other buildings in the west, particularly on the Californian coast.

In the north-west of the continent Vitus Bering, a Dane in Russian employ, discovered the strait which bears his name, and this led to the exploitation of Alaska by Russian fur traders. Thus, by the end of the eighteenth century there were four foreign powers vitally interested in the future of the continent.

When the white man first came to North America the land was inhabited by Indians and by Eskimos, but the total population of this vast area was almost certainly less than a million. The Eskimos were not greatly affected during the early days of settlement. But the Indians, who lived in scattered villages in the forests, or who roamed the open plains, were naturally antagonistic towards the "palefaces" who had invaded their land.

The Indians

The term "Indian" is misleading. It has persisted from the time when the Spanish explorers, thinking they had reached India, called the native people Indians.

The Indians vary greatly from tribe to tribe but they have certain characteristics in common—dark brown skin, deep-set black eyes, and long black hair. They are of Mongolian stock and probably came originally from Asia. The tribes had different modes of life according to their geographical environment. Some adapted themselves to the open plains, some to the forests, and some to the dry conditions of the south-west.

The Indians of the Plains were almost entirely nomadic and lived chiefly by hunting the buffalo and by fishing. They used the tomahawk, spear, or bow and arrow. Their homes were skin-covered tents or wigwams, which enabled them to move quickly when hunting.

The Forest Indians comprised many vigorous tribes such as the Iroquois, Mohicans, Hurons, etc. They hunted in the forest and fished in the lakes and rivers, and sometimes cultivated maize

and tobacco. The latter was mainly used for ceremonial purposes. Since they depended mainly on hunting and fishing, they lived chiefly in wigwams and made birch-bark canoes for fishing. These tribes evolved a fairly high standard of government, but their civilisation was not so high as that of the settled tribes of the south-west.

The Indians of the dry south-west, such as the Pueblo and Mojave tribes, lived where game was scarce. They were agriculturists, practised irrigation, and cultivated maize and tobacco. Many of them lived in villages of stone or mud huts. Other tribes lived in elaborate houses or caves dug out of the softer rocks. These Indians knew how to weave, make pottery, and work metals. The Aztecs of Mexico had achieved a well developed civilisation.

When the white man came to America he deprived the Indians of their lands. He regarded them as inferior and endeavoured to do away with their customs. These first contacts with Europeans brought war and epidemics and the number of Indians decreased. To-day, it is a different story. Most of the Indians live in areas known as Reservations which have been set apart for them, where they live mainly by trapping and fishing. Some have taken to modern ways and live and work in lumber camps, on farms, or in towns and cities.

In the U.S.A. over 200 tribes numbering about 525,000 individuals live mainly in reservations, west of the Mississippi. Canada has 208,000 Indians of whom 142,000 live on Indian Reserves.

In the north of Canada the Indian population is increasing rapidly and tribes such as the Chipewyan, the greatest of the caribou-eating tribes, are finding that their numbers are outstripping food supplies. Many have to depend on Government help.

In general, the Indian people of Canada are mainly poor, living in overcrowded shacks. The infant mortality rate among the Indians is nearly three times that of the white population.

The Eskimos

The Eskimos, or Innuits as they call themselves, are broad, sturdy people with light, yellowish skin, black eyes, and black hair. Their round, plump bodies make them look shorter than they really are, particularly in their bulky clothing which usually consists of an overshirt of caribou skin with sealskin trousers and boots. They live north of the tree line along the northern fringe of Canada and

Alaska and around the coasts of islands in the Arctic Archipelago and in Hudson Bay. They live mainly near the coast and have always gained a living from the sea, depending chiefly on fish and the mammals of the northern waters for food and clothing. To-day their lives are changing.

Where the Eskimos remain untouched by the white man's civilisation they still follow their traditional way of life which is adapted to the severe climate of the land in which they live. During the long, dark winters, several families share a communal hut made of driftwood or boulders covered with earth, moss, and snow. The igloo, or snow house, so often seen in pictures, is only a temporary dwelling built when they move from place to place. Their houses are low and compact in order to resist the fierce winds which sweep across the Arctic region, especially in winter. For lighting and heating they use crescent-shaped soapstone lamps which burn the blubber, or oil, from the seal, walrus, or whale. In spring and summer, when movement is freer, tents of seal or caribou skins are used, or if they have been in contact with white traders, they may even use cotton tents.

Traditionally, the Eskimos spend their lives in fishing, trapping, and hunting. For food they depend on fish, the flesh of seal and walrus and sometimes on small, white whales. At times they are able to supplement their diet with caribou and moose. These animals spend the winter in the open, stunted forests between Lake Winnipeg and Great Bear Lake feeding on the lichens beneath the snow. In summer they migrate towards the northern coastal areas where hunting by the Eskimos has seriously depleted their numbers.

The Eskimos show great skill in the construction and use of boats, sledges, and hunting weapons. The kayak, or canoe, is made from a wooden framework covered with sealskin, and many implements are fashioned from bone. Fine carvings are often made which are highly prized for their artistic merit and these are sold at trading posts where tea, tobacco, and cloth can be bought.

The advent of the white man brought disaster to the large Eskimo population because they had no resistance to contagious diseases such as smallpox and measles. Thousands died. Those that remain are slowly adapting themselves to inevitable changes. Trade came to the Eskimos with the demand for white fox skins and many were encouraged to trap these animals and sell the skins for comparatively high prices. With the money some were able

to acquire motor boats to make the journeys to the trading posts. With the development of the mineral resources in the north new opportunities presented themselves and many Eskimos have taken paid work and have settled in permanent homes. Those who work in the mines or on defence installations and airfields have proved to be skilful mechanics. A number of Eskimos' co-operatives have been formed among the fishermen who can now sell fresh fish for use in the mining areas and even to be taken to towns and cities further south.

Many young Eskimos attend village schools and some travel outside their homeland to acquire a higher education. The white man's food is available in village stores and the need to hunt and fish is no longer so pressing. Kerosene has, in many cases, taken the place of seal oil as fuel and many Eskimos have kerosene stoves for cooking. However, the changes come slowly and many Eskimos still follow their traditional pattern of life.

To-day, the Eskimos of Canada number about 12,000. They live in the North-West Territories, northern Quebec, and Labrador. There are also over 15,000 Eskimos in the American state of Alaska.

CHAPTER II

STRUCTURE AND PHYSICAL FEATURES

Relief

North America may be divided into four main relief divisions:—

(1) The Eastern Highlands.
(2) The Western Cordilleras.
(3) The Central Lowlands.
(4) The Highlands of Central America and the West Indies.

The first three of these divisions form belts stretching approximately north and south from the extreme north to the Gulf of

Fig. 1. North America: Relief Divisions.

Mexico, while the Highlands of Central America and the West Indies run roughly at right angles in an east-west direction (Fig. 1).

A simplified section across U.S.A. about Lat. 38° N. shows how the divisions (1), (2), and (3) are related to each other (Fig. 2).

Fig. 2. DIAGRAMMATIC SECTION ACROSS NORTH AMERICA.

(1) THE EASTERN HIGHLANDS.—These highlands include the Appalachian Mountains and the highlands of Labrador and Newfoundland. They nowhere exceed 7,000 ft, yet in the past, they have proved an important barrier between the Atlantic Ocean and the Central Lowlands. They are, however, broken by two major gaps:—

(*a*) The St Lawrence Valley,

(*b*) The Hudson-Mohawk Gap,

both of which form very important gateways to the interior.

The Eastern Highlands were elevated as mountains long before the Western Cordilleras. Indeed, they formed a high mountain range when the area now occupied by the Western Cordilleras was still below the sea. Since that remote time the Eastern Highlands have been worn down almost to a plain by the denuding action of weather, rivers, etc. Then earth movements slowly elevated the whole area, while the rivers which drained it cut down deep valleys

Fig. 3. GENERALISED SECTION ACROSS THE RIDGE AND VALLEY BELT OF THE APPALACHIANS, SHOWING HOW THE PRESENT OUTLINE HAS BEEN CARVED OUT OF FOLDED ROCKS.

as the land rose. Erosion continued to carve out the area, and the present outline of the Eastern Highlands bears little relation to the original mountain folds, so that what were once folded valleys now form the highest mountains (Fig. 3).

Perhaps the most important result of the elevation of the land is the fact that rivers like the Susquehanna, Potomac, and the James, which rise to the west of the mountains, flow eastward in deep valleys which provide important routes between the Atlantic coast and the interior.

A section west-east across the Appalachians shows the following parallel belts which run roughly south-west to north-east:—

(*a*) Plateau (Cumberland and Allegheny).
(*b*) Appalachian Valley.
(*c*) Mountain Ridges (*e.g.* Blue Ridge).
(*d*) Piedmont Plateau.
(*e*) Coastal Plain.

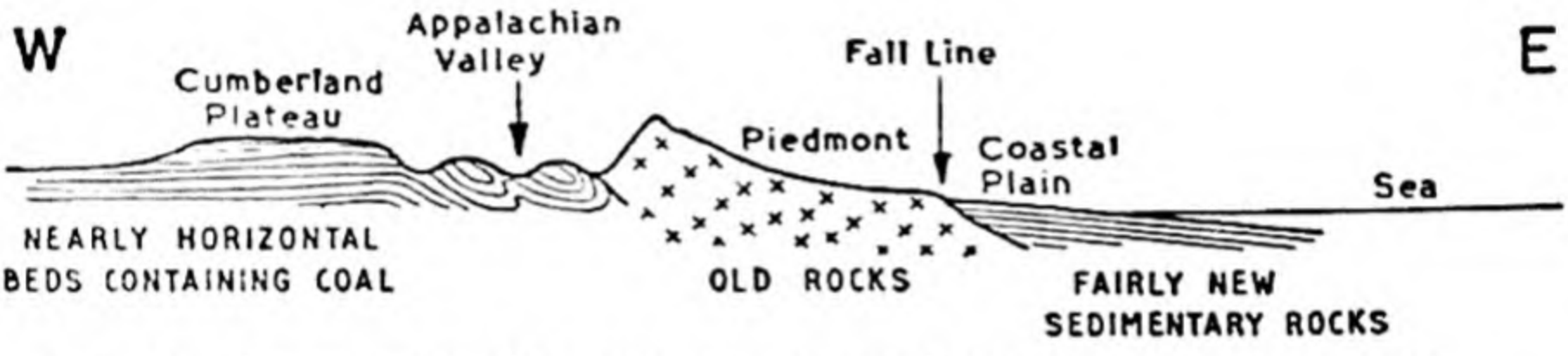


Fig. 4. GENERALISED SECTION ACROSS THE SOUTHERN APPALACHIANS.

Between the Piedmont Plateau and the Coastal Plain is a marked change of slope known as the "Fall Line", since the rivers which cross it do so by a series of rapids beyond which they flow across the Coastal Plain as broad deep streams often suitable for navigation by small ocean-going vessels. Since the "Fall Line" is the head of navigation of these rivers, important towns have grown up at these points, particularly as water-power is often available (Fig. 32). North of New York the Coastal Plain has sunk below sea-level and the Fall Line reaches the coast.

(2) THE WESTERN CORDILLERAS.—The Western Cordilleras form a marked contrast to the Eastern Highlands. They were folded into mountains at a comparatively recent period of geological time and are far higher and more extensive.

Fig. 5 shows that they consist of ranges of mountains flanking both sides of a complicated series of plateaux and basins. The Rocky Mountains and the Eastern Sierra Madre form the eastern ranges of the system (*see* plates facing pp. 17 and 64). Two parallel lines

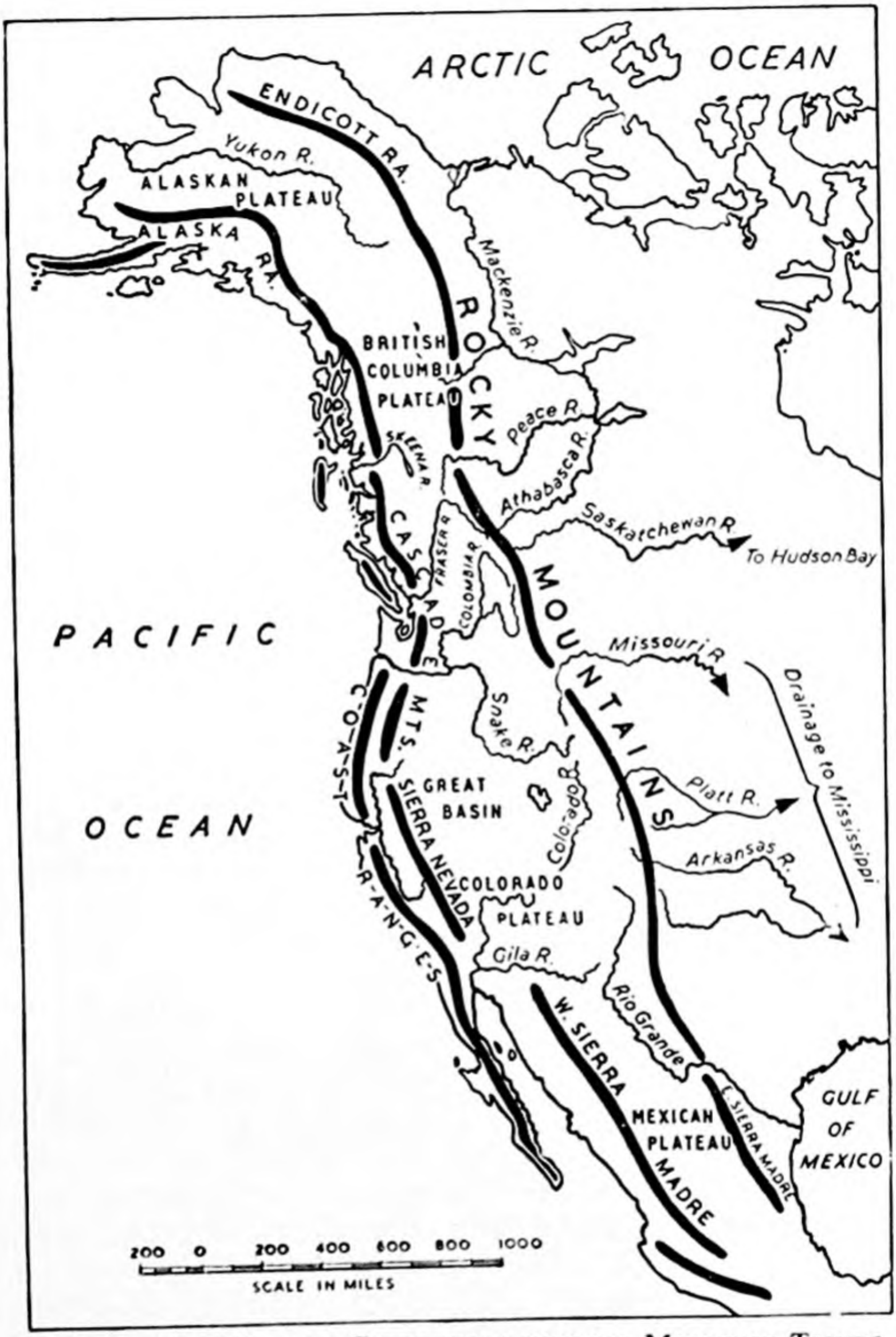


Fig. 5. THE WESTERN CORDILLERAS SHOWING MOUNTAIN TRENDS AND DRAINAGE SYSTEMS.

of ranges may be recognised on the west of the plateaux separated by long depressions which are sometimes occupied by the sea (Gulf of California) and sometimes form fertile valleys like those of California, the Willamette, and Lower California.

Much volcanic activity accompanied the formation of the Western Cordilleras and is still evident in the active volcanoes of Alaska (McKinley, 20,400 feet). There are many majestic cones of extinct volcanoes throughout the whole mountain system, while old lava flows sometimes occupy large areas of the lower ground. The lavas of the Snake and Columbia river basins around Spokane have been weathered to form very fertile soil, now of great value in the growing of wheat. Volcanic activity has also helped to produce valuable mineral ores such as gold, copper, and silver in many parts of the Western Cordilleras.

Between the eastern and western flanking mountains are high plateaux and intermont basins. The plateau of Colorado rises to over 6,000 ft in height but the surface levels of the plateaux of British Columbia and Alaska are lower. This system of plateau and basin is widest in the United States where the almost horizontal beds of rock which compose it have been faulted into enormous blocks and basins; the largest of these, the Great Basin, covers some 210,000 square miles. Many basins have no outlet to the sea, and once contained extensive salt lakes, some of which (Great Salt Lake) still remain, while others can only be recognised by the salt flats formed by the drying up of the original lake. To the south of the Great Basin the plateau country has been deeply trenched by rivers such as the Colorado, which has cut a magnificent gorge some 5,000-6,000 ft in depth. Further south the interior plateau is continued as the Central Mexican Plateau.

(3) THE CENTRAL LOWLANDS.—The Central Lowlands form a broad corridor from the Arctic to the Gulf of Mexico. They may be divided into two main parts as shown on Fig. 1.

(*a*) The Canadian Shield.

(*b*) The Mississippi Basin, Canadian Prairies, and western portion of the Mackenzie Basin.

(*a*) The Canadian Shield, which is the most ancient land surface in North America, consists of extremely old rocks which have been hardened and altered by earth movements and pierced by many

valuable mineral veins (Chapter VII). For a very long period of time these rocks have been exposed to denudation and worn down to a peneplain which slopes gradually to the Arctic (*see* plate facing p. 17). It is covered by numerous lakes and streams, most of which drain north. The streams which flow south to the St Lawrence usually form rapids where they cut the southern rim of the shield, thus providing abundant hydro-electric power.

(*b*) To the west and south of the Canadian Shield are vast plains composed of almost horizontally bedded sedimentary rocks, except where broken by islands of older rocks which stand out as isolated mountain masses such as the Ozark and Ouachita Hills. The lowlands in Canada are drained by the Mackenzie system to the Arctic and by the Saskatchewan River to Hudson Bay. The southern part of the Central Lowlands forms the basin of the Mississippi which flows into the Gulf of Mexico. The St Lawrence system, which includes the Great Lakes, lies in the north-east at the south-eastern edge of the Canadian Shield and drains to the Atlantic. There are no high relief features to mark the watersheds between these great river systems.

Although the Central Lowlands are everywhere low-lying when compared with the mountains which flank them to east and west, they are by no means of uniform height and rise westward towards the Rockies until they are over 1,200 ft high in the "High Plains" of the west. Denver is over 5,000 ft above sea-level.

The sedimentary rocks of the Central Lowlands are in many places rich in coal and oil (pp. 112-13).

(4) THE HIGHLANDS OF CENTRAL AMERICA AND THE WEST INDIES.—These are dealt with in Chapter XXI.

The Glaciation of North America

The surface features of the northern part of the Central Lowlands were largely formed by the work of vast ice sheets which occupied this part of the continent during the Great Ice Age.

Fig. 6 shows approximately the maximum extent of the ice sheet, which left behind extensive areas of sand, gravel, and boulder clay in many parts of the country. These deposits make useful fertile farm lands if not too stony or sandy, but where a large number of boulders occur agriculture is made very difficult until the larger stones are removed. Stony soil has hindered farming in many parts of New England and the Atlantic Provinces of Canada.

When great sheets of ice move over a land surface they cause irregularities both by scooping out hollows in the solid rock and by leaving piles of debris which obstruct the drainage when the ice has disappeared. The numerous lakes of the Canadian Shield may be attributed to this action.

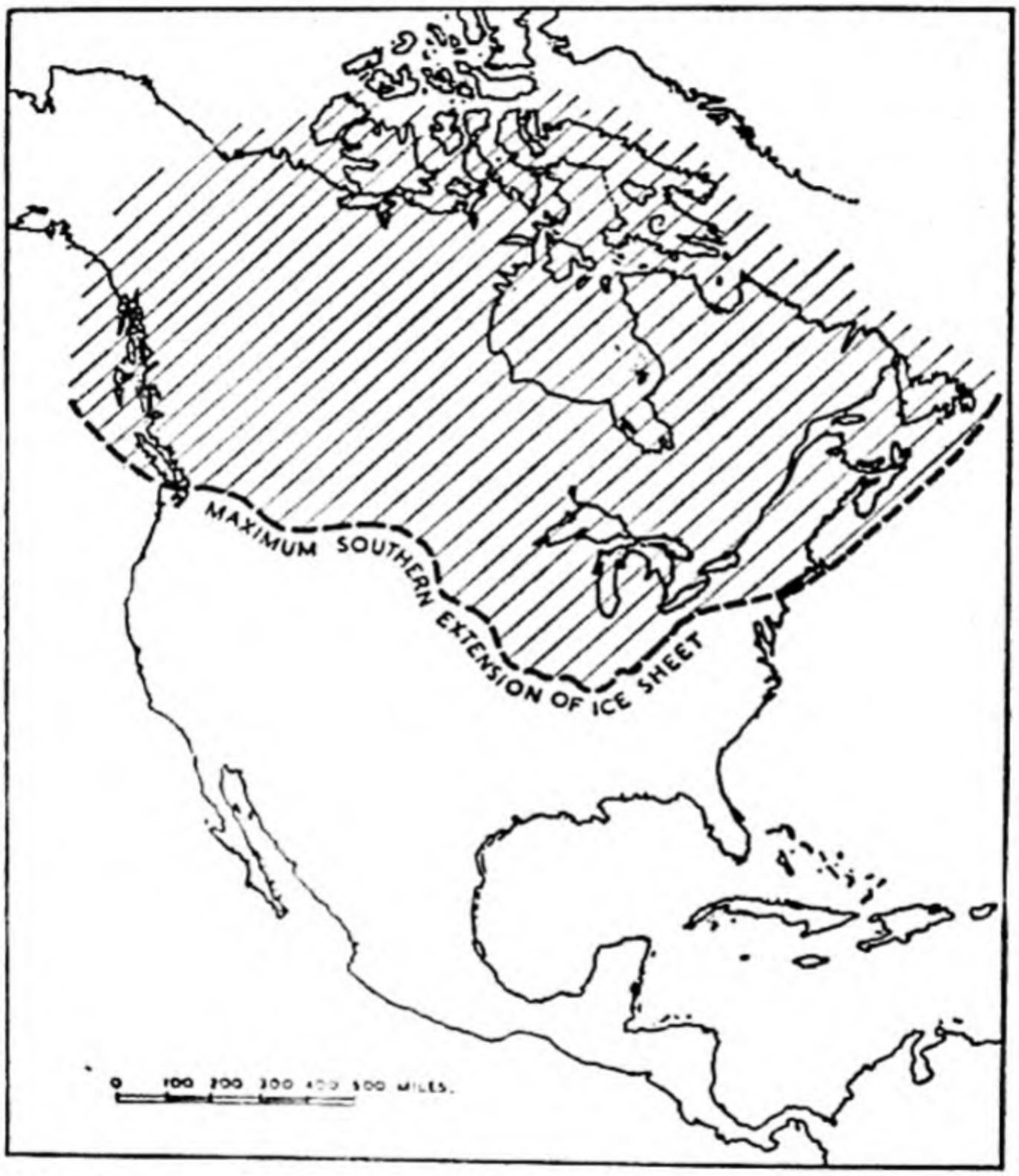


Fig. 6. THE MAXIMUM SOUTHERN EXTENSION OF THE ICE SHEET IN NORTH AMERICA.

The Great Lakes are perhaps the most valuable legacy which the ice left to North America. It is believed that before the Ice Age a river occupied the lowlands, now drained by the St Lawrence and Great Lakes, and drained to the Atlantic. When the edge of the ice sheet lay along the northern edge of this lowland and across the lower end of the valley (Fig. 7) it prevented the water escaping to the sea along the St Lawrence Valley. To the south was the low

watershed which separated the ancient St Lawrence Valley from the Mississippi. Thus a large sheet of water was dammed up between the edge of the ice and the watershed to the south (Fig. 8). The extent of the lake varied as the edge of the ice sheet changed its position. Ultimately the water escaped over the lowest gaps in the southern watershed. The exact position of the escape or overflow of the water varied during the Ice Age, but each outflowing stream cut a channel which has now become a useful route for man. At one time the water escaped to the Mississippi near Chicago, and was responsible for a gap now followed by the Michigan and Illinois Canal and several railways. Other important ways of escape were via the Hudson-Mohawk Gap and via the Champlain-Hudson Gap. In both cases the water followed existing valleys which were deepened.

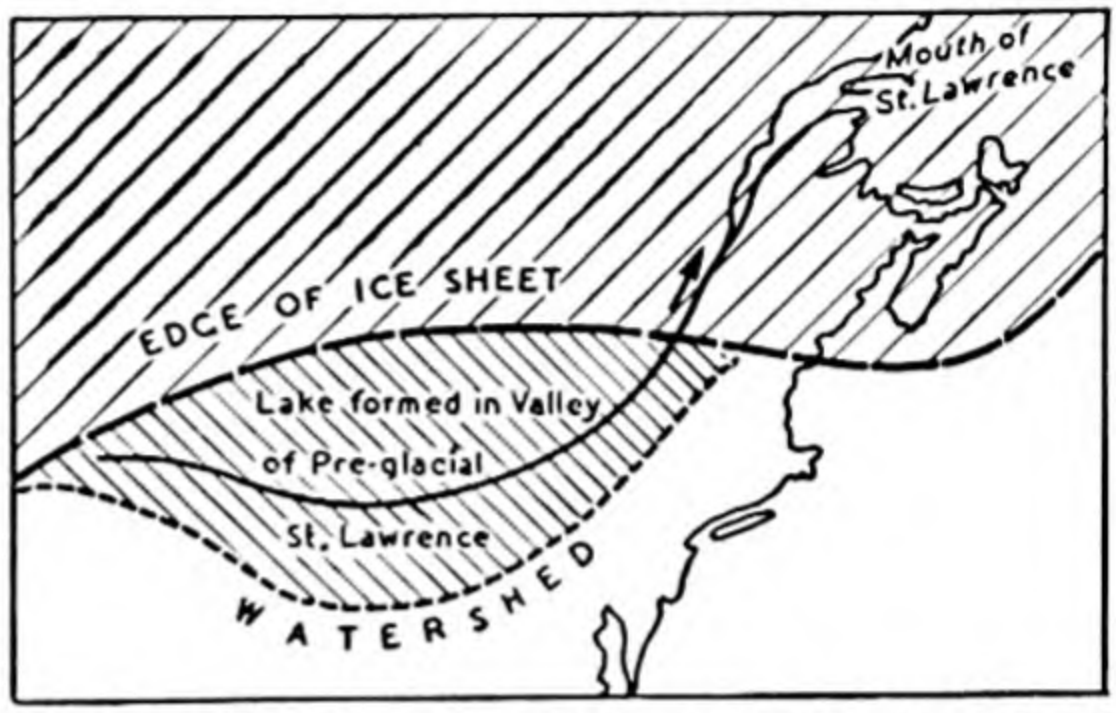


Fig. 7. DIAGRAM SHOWING THE BEGINNINGS OF THE GREAT LAKES.

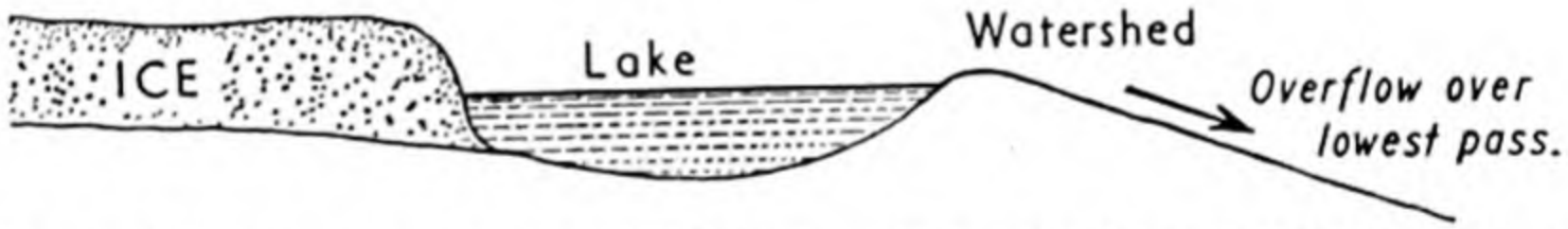


Fig. 8. DIAGRAM TO SHOW HOW WATER OVERFLOWING FROM LAKES ON THE EDGE OF THE ICE SHEET CUT GAPS IN A WATERSHED.

Eventually the ice sheet left the mouth of the St Lawrence and the lakes would have drained away to the Atlantic and so been lost to North America, but the land near the mouth began to rise and formed a barrier which imprisoned the waters, and thus the present form of the St Lawrence and the Great Lakes came into being. Many other lakes which were dammed by the ice have since drained away leaving fertile clays which now provide valuable farmland, as in the Red River Basin, near Winnipeg.

CHAPTER III

CLIMATE AND VEGETATION

General Considerations

Two facts which have a great influence on the climate of North America are as follows:—

(1) The north to south trend of the Western and Eastern Highlands which makes the Central Lowlands a corridor open to both the influence of the cold Arctic Ocean and the warm Gulf of Mexico. "Cold waves", which are a feature of winter climate in U.S.A., are produced when Arctic air penetrates south into this corridor and may result in frozen water surfaces even as far south as New Orleans. The "hot waves" of summer are due to the influx of warm air from the south which passes north through the Mississippi Basin.

(2) The ocean currents and prevailing winds which are shown on Fig. 11 also have a great effect on the climate of North America. North of latitude 40° N. the prevailing winds are south-westerly, but there is actually much variation in wind direction in this belt, due to the passage of cyclonic depressions which are very frequent in winter. South of latitude 30° S. the land is in the belt of the north-east trade winds. These are fairly constant over the West Indies and Central America but in summer the heat of the interior pulls them over the Gulf coast of the U.S.A. as southerly winds. Between latitudes 30° N. and 40° N. the wind belts change with the movement of the overhead sun, so that in winter this region is in the westerly wind belt and in summer it comes under the influence of the north-east trades. The direction and character of the ocean currents which affect North America are shown on Fig. 11. North of latitude 40° N. the west coast is warmed by the North Pacific Drift while the Labrador Current cools the east coast. South of latitude 35° N. the reverse is the case since the cool Californian current flows south off the west coast while the south-east coast of the U.S.A. is warmed by the Gulf Stream. The effect of these currents on the neighbouring coasts may be seen from the following temperature figures (*see* p. 15).

North of Latitude 40° N.	**West Coast** (warm current) Victoria (Lat. 48½° N.) Jan. 4° C. (*39° F.*) July 16° C. (*60° F.*)	**East Coast** (cool current) St John's (Lat. 47½° N.) Jan. −4° C. (*24° F.*) July 16° C. (*60° F.*)
South of Latitude 35° N.	**West Coast** (cool current) San Diego (Lat. 35½° N.) Jan. 12° C. (*54° F.*) July 19° C. (*67° F.*)	**East Coast** (warm current) Charleston (Lat. 38¼° N.) Jan. 9° C. (*49° F.*) July 27° C. (*81° F.*)

Temperature: Winter Conditions

A good atlas shows the main January isotherms reduced to sea-level. It is important to note that the 0° C. (*32° F.*) isotherm bends south of the Great Lakes and, owing to the presence of the warm Pacific Drift, approaches the western coast at a more northerly latitude than that at which it leaves the east coast where the cooling influence of the Labrador Current is felt. If one includes the

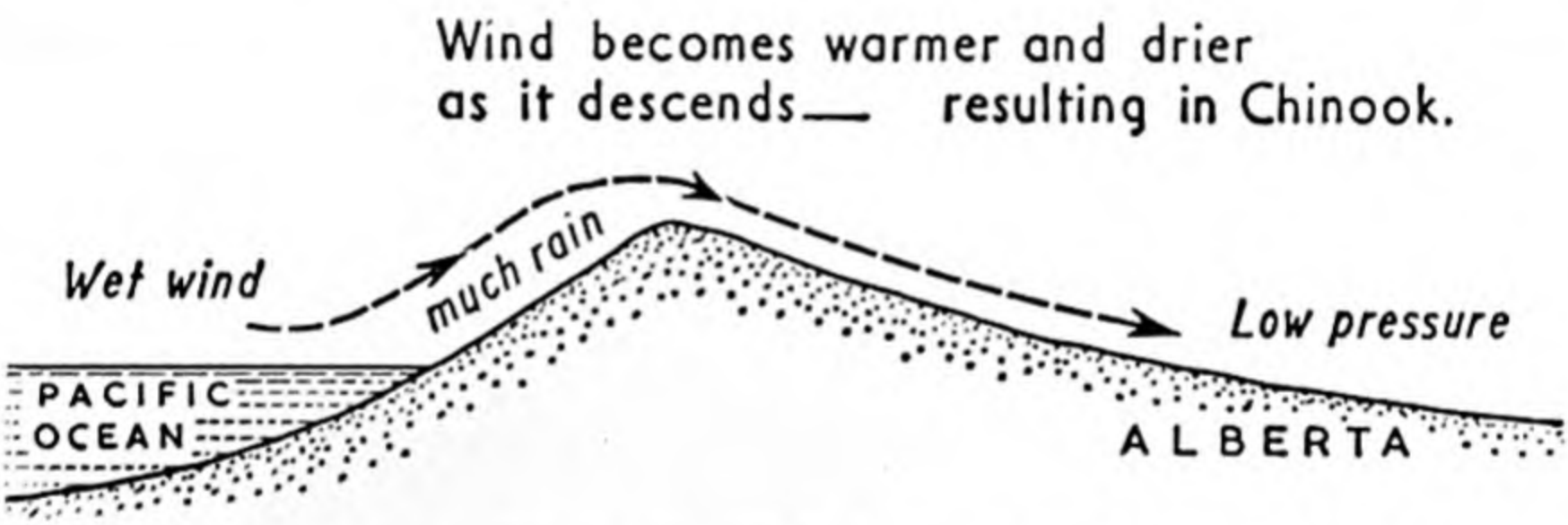


Fig. 9. DIAGRAM TO SHOW THE ORIGIN OF THE CHINOOK WIND.

mountainous regions where temperatures are low due to high altitudes, about two-thirds of North America has an average winter temperature below freezing point—0° C. (*32° F.*). In the extreme north the average temperature of the Arctic coastlands lies very much lower. Thus, apart from the coast of British Columbia, all Canada has an average January temperature below freezing point. Blizzards are frequent in the north although there is little precipitation except on the east and west coasts. Two moderating influences make for higher winter temperatures in parts of Canada:—

(*a*) The Chinook Wind. (*b*) The Great Lakes.

(*a*) *The Chinook* is a warm dry wind, similar to the Föhn of the Alps, which blows in winter in Alberta. Fig. 9 illustrates how the

presence of an area of low pressure in the centre of North America causes air to be drawn over the Western Cordilleras. As it ascends the western slopes of the mountains it loses moisture and passes down the eastern side as dry air warmed by compression in its descent to the plains. This warm dry air has been known to raise the temperature by more than 20 C° (*36 F.°*) in half an hour and to melt a foot or more of snow in an hour. It is largely due to this wind that the cattle grazing lands of Alberta, which occur at the eastern foothills of the Rockies, are kept open in winter.

(*b*) *The Great Lakes* have a warming influence on their eastern shores since the prevailing winds are from the west. Thus, the mean January temperature for the west side of Lake Michigan is lower than that for the east. This warming effect has made it possible to grow fruits such as grapes successfully in a belt of country east of the lake.

Temperature: Summer Conditions

In July, apart from high mountains, all North America has a temperature above freezing point. The hottest parts are in the arid south-west were the average sea-level temperatures are over 32° C. (*90° F.*).

Except for the east and west coasts and the southern states of the U.S.A. bordering the Gulf of Mexico much of North America has a large annual range of temperature. The table given below shows how the range of temperature varies along a line of latitude (approximately 50° N.).

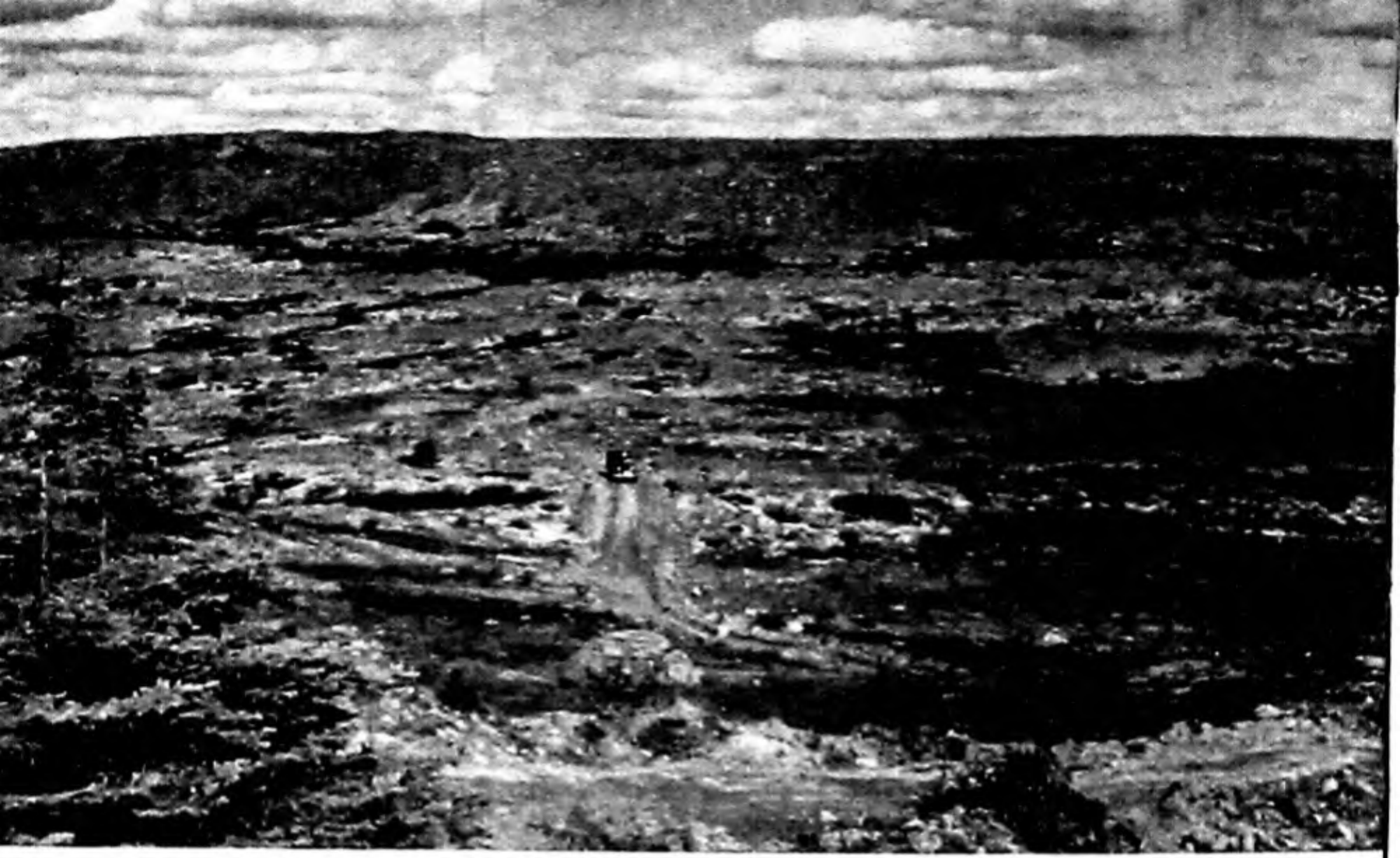
	Victoria (West Coast)	Winnipeg (Central Plains)	St John's (East Coast)
January	4° C. (*39° F.*)	−19° C. (*−3° F.*)	−4° C. (*24° F.*)
July	16° C. (*60° F.*)	20° C. (*68° F.*)	16° C. (*61° F.*)
Range	12 C.° (*21 F.°*)	39 C.° (*71 F.°*)	20 C.° (37 *F.°*)

Rainfall

Where winds pass from the sea to the land the rainfall is usually great. This is particularly true where the sea is warmed by a warm current (*i.e.* north-west coast of British Columbia and south-east coast of the U.S.A.). In both cases the warm winds have taken up a great deal of moisture from the sea. As they rise over the land and so become cooled a heavy precipitation results. Further inland

Above: Indians of the Dog Rib Band arriving at the Indian village at Yellowknife to receive the annual treaty money paid them by the Government. The traditional costume is rarely seen now, like the birch bark canoe. Note the out-board motor. *(National Film Board of Canada.)*

Below: A photographer greets Eskimo women at the Eskimo summer camp at Button Point, Bylot Island, North West Territory. *(National Film Board of Canada.)*



The Can. ... w of rocky Labrador terrain in the Ungava area. ... the outcrops ... canty vegetation and the poor drainage. (*National Film Board of Canada.*)

The Rockies—a view of Mount Rundle from Banff National Park, Alberta.

the rain decreases and tends to fall mostly in summer when high temperatures cause the air to rise. Where inland mountains obstruct the winds very little rain falls on the leeward side and

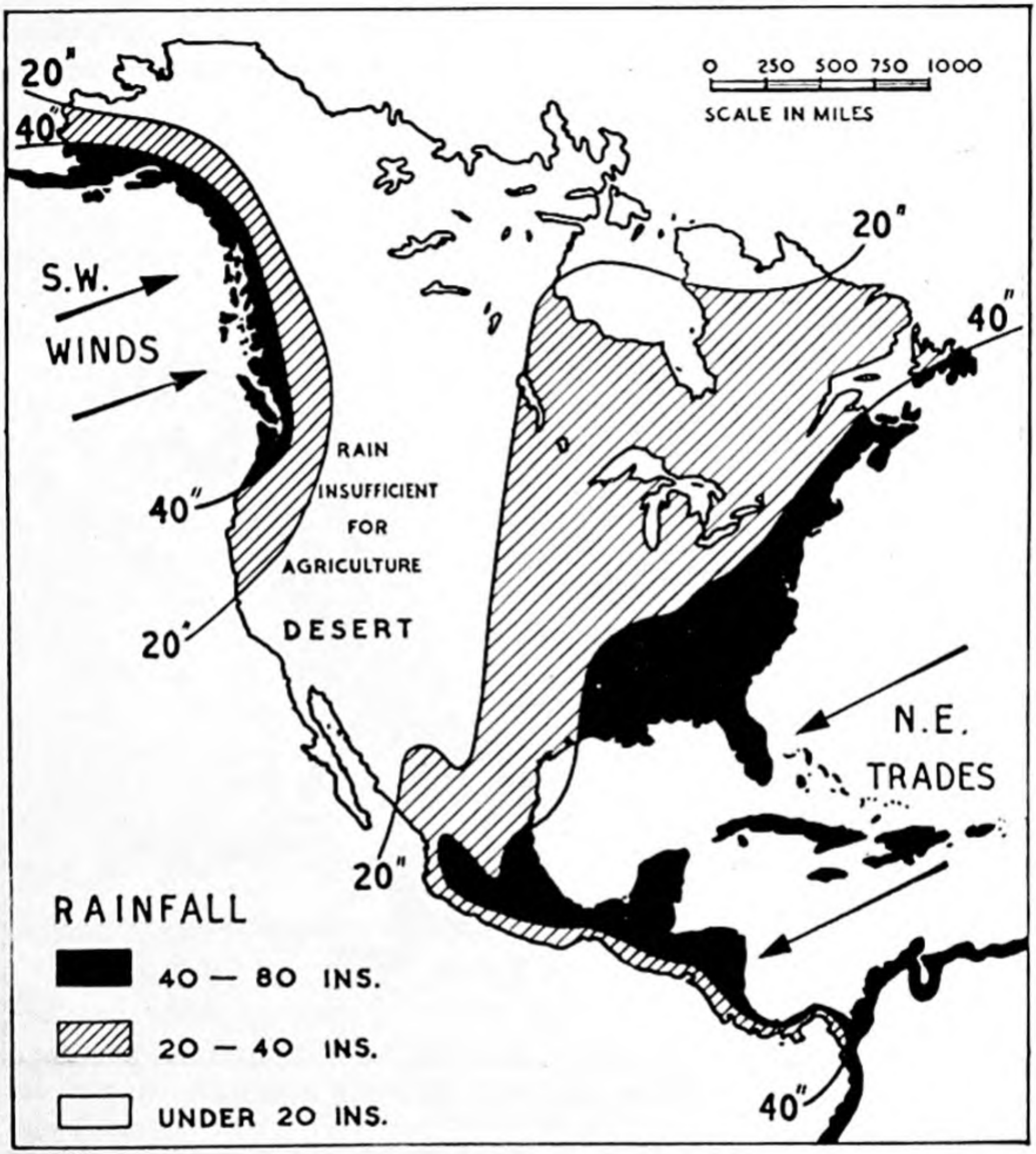


Fig. 10. ANNUAL RAINFALL OF NORTH AMERICA.

marked "rain shadow" areas exist. Much of the mountainous plateau-country of North America south of latitude 35° N. is a typical rain shadow region. Fig. 10 shows the average rainfall of

North America and illustrates the facts just discussed. In general the land which has a rainfall below twenty inches a year is unsuitable for agriculture unless irrigation or dry farming is practised. Where the temperature is high, more than twenty inches may be required, but where lower as in the prairies of Canada agriculture

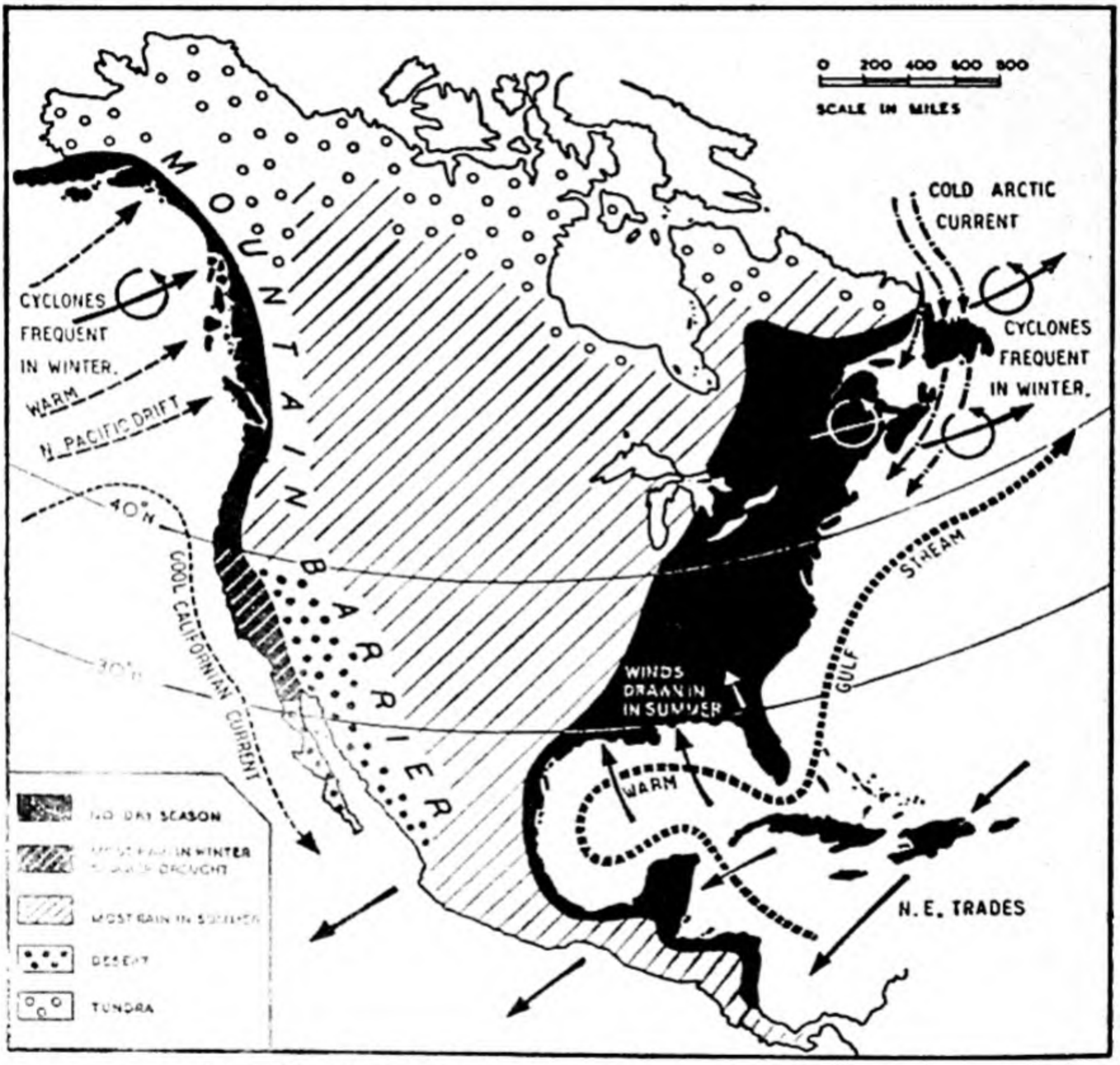


Fig. 11. NORTH AMERICA. SEASONAL RAINFALL.

can be successful with as little as fifteen to twenty inches. Where rainfall is lower, irrigation or special methods of farming are necessary.

Although the actual amount of rain which falls is important, the time of year when most falls largely determines the type of vegetation. Fig. 11 shows the seasonal distribution of rainfall. It will be

noted that much of the rain and snow which falls in Eastern Canada and Newfoundland is due to the passage of cyclones which are characteristic of the south-west wind belt. Other features which affect the climate are the destructive tornadoes of the Mississippi valley and the hurricanes which cause much damage in the West Indies and along the Gulf Coast. They are most frequent in autumn.

Natural Vegetation

The natural vegetation of a country depends largely on soil and climate. Since North America extends from Arctic to tropical regions and has much variation in altitude and climate, there is a great variety of natural vegetation.

Tree growth is limited by the amount of moisture available and by exposure to strong winds. In general, where there is no dry season, forests are the natural vegetation, the type of forest depending on the temperature conditions. Forests adapted to drier conditions are found in the coniferous belt which occupies the greater part of the Canadian Shield [*see* Fig. 12 (2)], and in regions which have a Mediterranean climate [Fig. 12 (8)], where evergreen shrubs and stunted trees are characteristic.

Much of the interior of North America is too dry for forest growth. Where summer rainfall is sufficient the natural vegetation is grass with trees confined to the river valleys. These grasslands or Prairies are found in the western interior of Canada and the U.S.A. As the deserts of the south-west are approached, grass becomes very poor and is replaced by grey sage bush and similar plants.

Major Natural Regions of North America

North America may be divided into major natural regions within each of which there is a general similarity of climate and natural vegetation. It must, however, be recognised that local differences of latitude, altitude, and soil can provide variation from the general conditions. Since each region gradually merges into an adjacent region, it is not possible to define it by an exact line. The lines shown on Fig. 12 must therefore be regarded as the approximate limits of each type.

(1) *Tundra Type.* In these regions winters are long and cold with temperatures below zero. Summers are short and warm with long hours of sunlight, but the heat is only sufficient to thaw the

surface soil. About twelve inches below the surface the water in the rocks is permanently frozen, a condition known as permo-frost. Precipitation is small, with a small summer maximum. Severe blizzards occur in winter. Under such conditions only low-growing plants survive. Mosses, lichens, and dwarf willows grow in the

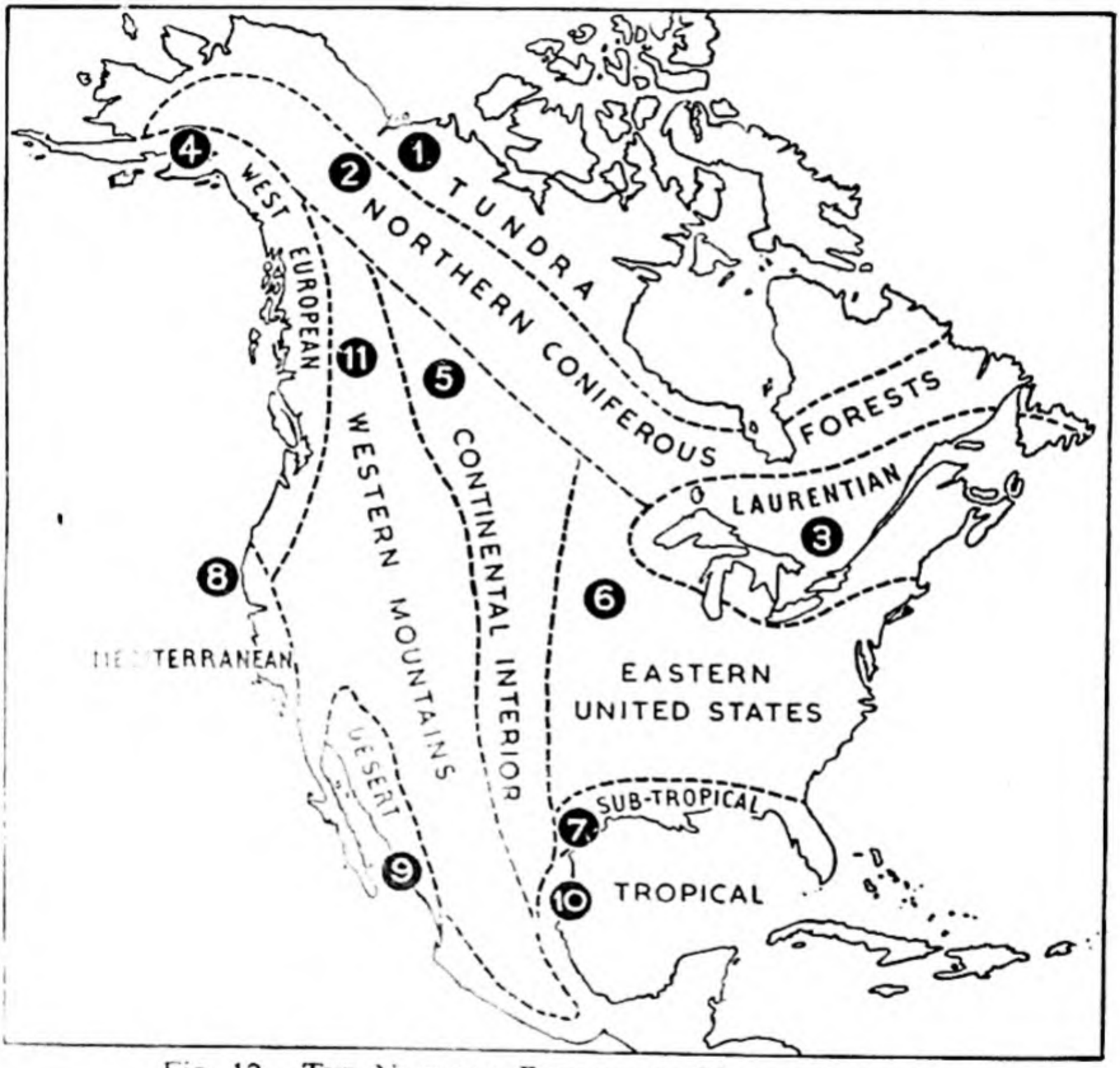


Fig. 12. THE NATURAL REGIONS OF NORTH AMERICA.

more favoured parts. There are also patches of Arctic flowering plants studded with bright flowers in the short summer when the berries on bushes of cranberry and blueberry attract migrating birds. The vegetation of the tundra provides food for wild caribou deer and for reindeer which have been introduced into Alaska and the Northern Territories of Canada. The soil is unsuited to agriculture,

but in a few areas successful attempts have been made to cultivate crops which mature quickly because of the long hours of sunshine in summer. Such crops include cabbages, potatoes, and radishes, for local use. Even hardy cereals have been grown successfully.

(2) *Northern Coniferous Forests Type.* This region experiences long, cold winters but, as it is further south than the tundra, conditions are not quite so severe and there is no permo-frost. Average July temperatures may rise to over 16° C. (*60° F.*) but winters are very cold with average January temperatures approaching −20° C. (*−4° F.*). Total precipitation is small with a maximum in summer. Strong winds are often experienced.

Coniferous forests of pine, spruce, and fir are well adapted to this climate since the shape of the trees prevents snow from resting long on the branches and the relatively thin, pliable trunks readily bend with the wind. The chief wealth of the region, apart from minerals (pp. 52-5), comes from the timber and from the pelts of fur-bearing animals.

(3) *Laurentian Type.* This region embraces the valley of the St Lawrence River. Very cold winters cause the St Lawrence to freeze as well as the seas off the coast except in the south where the influence of the warm Gulf Stream is felt. Average January temperatures range between −12° C. (*10° F.*) and −4° C. (*24° F.*) according to position, while average July temperatures range between 16° C. (*60° F.*) and 21° C. (*70° F.*). Precipitation occurs at all seasons and reaches between 40 and 50 in. annually. The natural vegetation consists of coniferous trees with deciduous trees such as maple in the southern parts. This region contains most of Canada's great soft-wood industry where paper is made from pulped wood. Wood-pulp and paper are important Canadian exports. There are, however, areas of mixed farming, dairying, and fruit growing—especially of apples and pears.

(4) *West European Type.* This natural region is so-named because the climate and vegetation resemble those of Western Europe, particularly of Norway. It is found along the north-west coast where the warm Pacific Drift keeps the sea and the rivers free from ice (*see also* Fig. 11). Average January temperatures do not fall below 0° C. (*32° F.*) while average July temperatures rarely reach 18° C. (*64° F.*). Abundant rain falls at all seasons. The characteristic natural vegetation consists of large coniferous trees such as the

Douglas Fir. Such trees provide valuable timber and give rise to an important lumber industry.

(5) *Continental Interior Type.* Since this type includes an area which stretches through some 25° of latitude there is considerable variation in temperature conditions. In general, the climate is extreme with average January temperatures well below freezing point in the north. Summers are hot; the average July temperature varies from 19° C. (*66° F.*) in the north to over 27° C. (*80° F.*) in the south. Rainfall decreases from east to west and is seldom more than 23 in. annually. The rainfall is uncertain and drought is often experienced. Summer is the season of maximum rainfall which frequently falls during thunder storms. The natural vegetation is grass. In many areas—the Prairies, for example—the land is now cultivated, but in the drier areas dry farming or irrigation is necessary if crops are to survive. This is one of the regions in North America which suffers from soil erosion when areas are left bare due to heavy grazing or the failure of crops.

(6) *Eastern United States Type.* Most of the U.S.A. east of the 23-in. isohyet (approximately longitude 100° W.) lies in this region. While temperatures vary with latitude, the region as a whole has a fairly equable climate. Although average January temperatures are above 0° C. (*32° F.*), much lower temperatures may be experienced in the north during a cold spell. Summers are everywhere hot with July temperatures over 21° C. (*70° F.*). While rain falls at all seasons, there is a maximum in summer when winds are drawn into the heated interior. Annual rainfall is everywhere above 23 in. and is sufficient for agriculture. Natural vegetation consists of deciduous forest of oak, hickory, magnolia, etc. Except on the Appalachian Mountains, much of the area now forms the best agricultural land in the U.S.A. Winter wheat, tobacco, maize, and cotton are some of the most important crops.

(7) *Sub-tropical Type.* Florida and the Gulf Coast of the U.S.A. are the principal areas. In this region, winters are warm with an average January temperature of about 13° C. (*55° F.*), although cold spells are sometimes experienced. Summers are hot with average July temperatures of over 27° C. (*80° F.*). Rain falls at all seasons, the maximum occurring in summer. The natural vegetation includes palms, cypress, and southern pines. The cultivated land produces such crops as grapefruit, sugar-cane, and rice.

(8) *Mediterranean Type.* Lying between latitude 40° N. and 35° N. on the west coast of California is an area which experiences the hot, dry summers and warm, wet winters which characterise a Mediterranean climate. The natural vegetation of the lowland is dull green scrub of which the gaunt chaparral trees are typical. All plants must be able to exist through the hot, dry summer. To do this they develop various characteristics such as thick, glossy leaves or very small leaves and long roots. The rainier mountain slopes may be clothed with warm evergreen forests.

The abundance of sunshine is very suitable for fruit growing although irrigation is necessary in the drier areas.

(9) *Desert Type.* Deserts and semi-deserts occur on the western side of the continent in the trade wind belt and in basins sheltered by the Western Cordilleras. Summers are extremely hot; the average July temperature is between 27° C. (*80° F.*) and 32° C. (*90° F.*). Average January temperatures are about 10° C. (*50° F.*). Although the annual range of temperature is not great, the daily range may be quite large with over 38° C. (*100° F.*) during the day and as low as freezing point at night. Rain rarely occurs but when it falls it comes in heavy storms. Little can be grown in a true desert. Cacti and Joshua trees survive with the aid of dew or where there is slight rainfall. Where irrigated the desert can produce fine crops of fruit, particularly sub-tropical varieties.

(10) *Tropical Type.* The south-eastern coast of Mexico and the West Indies are of this type. The climate is equable with very warm winters [January, 21° C. (*70° F.*)] and hot summers [July, 27° C. (*80° F.*)]. The natural vegetation consists of tropical forests of palms, mahogany, logwood, etc., except where the soil condition or smaller rainfall prevents tree growth as in the Yucatan Peninsula. The lowlands and lower slopes of the mountains have been intensively cultivated. Bananas, oranges, sugar-cane, tobacco, coffee, and cacao are among the many crops grown.

(11) *Western Mountain Type.* It is not possible to generalise about the climate and vegetation of this region since there is great variation of latitude and altitude.

CHAPTER IV

CANADA: GENERAL

Political

The growth of modern Canada dates from 1869 when the British North America Act federated four provinces into the Dominion of Canada. By 1905 a confederation of nine provinces was completed, and Newfoundland joined it in 1949 to make the number ten. Canada is a self-governing Dominion of the British Commonwealth, with a House of Commons and Senate, owing allegiance to the Crown, represented by a Governor-General. Each province has its own Government and the Yukon and North-West Territories are administered by Commissioners appointed by the Governor-General. The Dominion Parliament meets at Ottawa.

Population

Although Canada appears as such a large country on a map of the world, with an area of over 3½ million square miles—more than a quarter of the whole British Commonwealth—vast areas are unsuitable for permanent settlement. The total population is over 20 million, and 90 per cent. of the people live in a narrow belt about 200 miles wide along the southern border with the U.S.A. The average density of population for the whole country is about 5 persons per square mile, compared with 590 persons per square mile in the United Kingdom.

Canada has received immigrants from many European countries: less than half the people of Canada are of British stock. Over 5½ million are French-speaking Canadians who have descended from the original French colonists. There are about a million Canadians of German origin; and thousands of Italian, Scandinavian, Ukrainian, Dutch, Jewish, and Polish extraction. Most of the French-speaking people live in the province of Quebec where they make up more than four-fifths of the population. About 45 per cent. of the people of Canada are Catholic.

The figures below show the growth of Canadian population:—

1871	...	3,689,257	1921	...	8,787,949
1881	...	4,324,810	1931	...	10,376,786
1891	...	4,833,239	1941	...	11,506,655
1901	...	5,371,315	1951	...	14,009,429
1911	...	7,206,643	1961	...	18,238,247

The decade 1901-11 showed a rapid increase, for it followed a period of railway construction and saw the development of the Prairies as wheat-growing lands. Population growth has also been rapid since the 1939-45 war, largely due to the expansion of industry, the exploitation of mineral wealth, and immigration. Canada's population has increased by over 50 per cent. in the last twenty years. Over 2 million people, mainly from Britain, Italy, and Germany have been admitted to Canada since 1945.

The population is concentrated mainly in four regions:—

(1) The Atlantic Provinces.
(2) The St Lawrence Valley and Lake Peninsula.
(3) The Prairie Provinces.
(4) The valleys of British Columbia.

Between these populated areas lie natural barriers to communication—the Appalachian Mountain barrier, the barren rocks of the Canadian Shield, and the Rocky Mountain barrier—all of which are sparsely populated. The populated areas of Canada have better communications with areas in the United States to the south than they have with one another. The Atlantic Provinces are closely linked with New England; the St Lawrence Valley and Lake Peninsula by water with the lake shores of the U.S.A.; the Prairies with the Middle West; and British Columbia with the Pacific States of Washington, Oregon, and California. Thus, while Canada is linked politically with Britain, American ways of thinking and acting have a very powerful influence on the country. Moreover, a great deal of American money is invested in Canada; most of the motor car industry, three-quarters of the oil industry, and half the mines are financed with American capital.

Natural Resources

Canada is a land of great natural resources. Forests cover nearly one half of the land area of the Dominion, and the more accessible parts of these can be exploited for timber. Much of the

soft wood is converted to wood-pulp, paper, and cellophane. The manufacture of pulp and paper is Canada's largest single industry. Fur-bearing animals are found in the forests and in the more open country to the north, though the numbers are now somewhat depleted owing to excessive trapping. Furs are nevertheless an important commodity.

Off the east coast of Canada are fishing grounds noted for cod and lobsters; on the west coast salmon abound in the swift mountain rivers and halibut in the sea. Canada ranks third among the nations of the world as an exporter of fish.

The soil and climate of Canada vary from province to province and there are consequently many types of farming. In the Atlantic Provinces mixed farming predominates, in the St Lawrence Valley and Great Lakes region dairying is more important, while the southern parts of Manitoba, Saskatchewan, and Alberta provide some of the finest wheat-growing land in the world. The foot-hills of the Rockies are good cattle ranching country, and irrigated fruit orchards flourish in the southern valleys of British Columbia. Canadian farming thus yields a diversity of products, but almost all the farms have one thing in common—they are family farms, owned or rented by the people who work them.

Mineral ores are found in every part of Canada, but particularly in the old rocks of the Canadian Shield and in the younger folded ranges of the Western Cordilleras. Canada leads the world in the production of nickel and asbestos; is second in output of platinum, uranium, and gold; third in zinc, and fifth in copper, lead, and iron ore. It is also one of the main producers of potash. The output of these minerals, with the exception of uranium for which present demand is not great, is steadily increasing.

Reserves of water-power, coal, oil, and natural gas are enormous and they all provide power in various forms for industrial development and domestic purposes. Most of Canada's electricity is generated in hydro-electric stations using the fast-flowing rivers to provide power, though coal, oil, and natural gas are used in areas near the coal and oilfields. Hydro-electricity is very important in Quebec, Ontario, and British Columbia (*see* Fig. 13). There are plans to harness the Nelson River which flows from Lake Winnipeg to Hudson Bay and this may well lead to important developments in northern Manitoba.

The chief coal producing areas of Canada are:—

(1) The Rocky Mountains and foot-hills country in the south and west of Alberta which has the largest reserves of coal in Canada. Production of coal in this area has, however, declined in recent years with the development of the Alberta oilfields, and the change over on the railways to diesel operation.

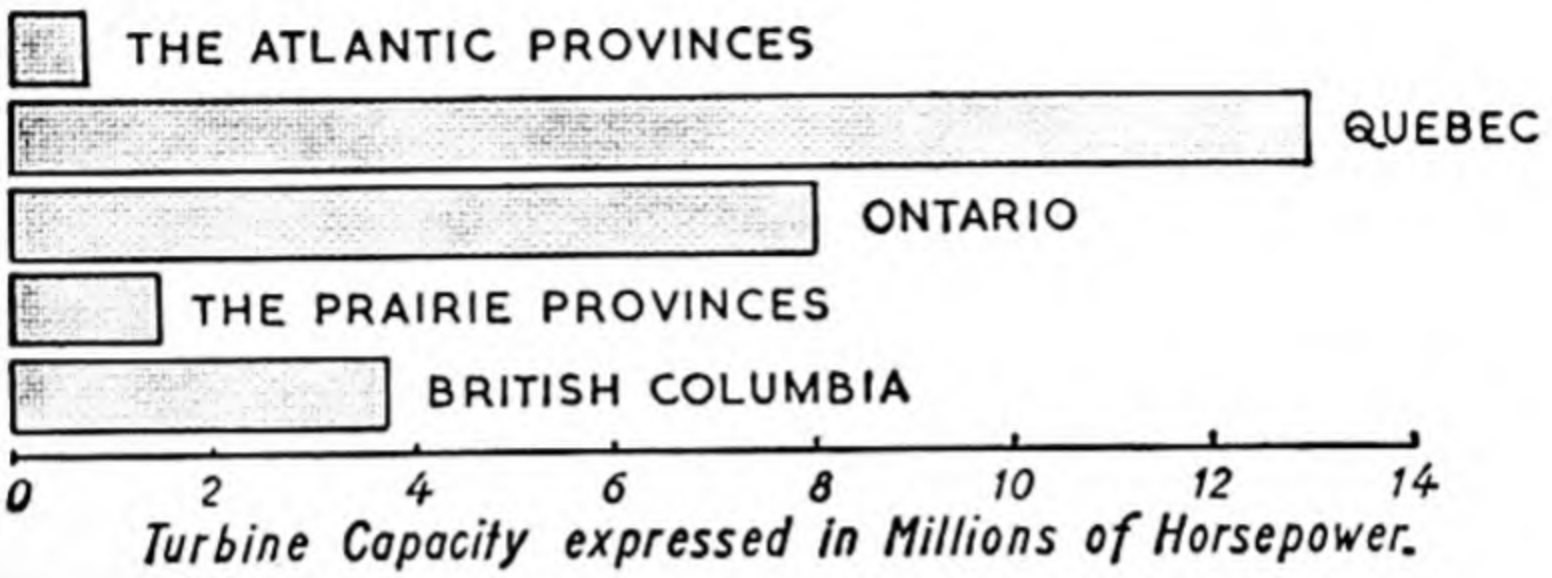


Fig. 13. HYDRO-ELECTRIC POWER IN CANADA.

(2) The coalfields of Nova Scotia and Cape Breton Island in the Atlantic Provinces which provide coal for an important iron and steel industry at Sydney.

Fig. 14. THE COALFIELDS OF CANADA.

(3) The coalfields of British Columbia which have declined in importance and do not even satisfy local needs.

(4) The Saskatchewan coalfield which produces brown coal and lignite.

Coal production has declined a little in recent years owing to the increasing production of oil as an alternative fuel.

Oil and natural gas are found in Alberta along the eastern flanks of the Rockies, and in Saskatchewan. The reserves of oil are enormous, probably greater than in any other part of the world. These oilfields have been developed very rapidly in recent years. The largest are the Redwater field, just north of Edmonton, and the Leduc and Pembina fields south-west of Edmonton (*see* Fig. 15). There is a smaller oilfield with a refinery in the Turner Valley, south-west of Calgary. Oil also occurs in large quantities in sandy rock known as the "Tar Sands" in the McMurray area of the Athabaska River valley. More recently new oilfields have been discovered in the extreme north-west of Alberta. In all these areas supplies of natural gas are available which are used locally for lighting and heating. Natural gas is also taken by pipeline to

Fig. 15. THE OILFIELDS AND OIL PIPELINES OF CANADA.

Vancouver on the Pacific coast, to the large cities of Eastern Canada, and to mid-western and western United States.

Oil from the Redwater and Leduc fields is taken by pipeline from Edmonton to Lake Superior and thence to Sarnia on the Lake Peninsula (*see* pp. 49-50 and 62), where the oil is refined—a distance of nearly 1,800 miles. A second pipeline takes crude oil from Edmonton across the Rocky Mountains to Vancouver in British Columbia. There are over 100,000 miles of pipeline carrying petroleum products and 40,000 miles carrying natural gas in Canada. Even so, oil is still imported, mainly from Venezuela, to refine in Montreal and distribute in Quebec and the Atlantic Provinces. Alberta produces two-thirds of Canada's output of oil, Saskatchewan a quarter, and the rest comes from Manitoba,

Ontario, and the North-West Territories. Uranium is now being used to provide nuclear power.

The power resources and raw materials of Canada have given rise to considerable industrial development. Coal is available for smelting iron and other metals, and electricity is developed at low cost, to provide power for the manufacture of aluminium, wood-pulp, paper, and textiles. Industrial development is mainly in eastern Canada: Quebec and Ontario together contain the chief industrial areas, Ontario producing about one-half and Quebec one-third of Canada's manufactured goods. Most of the industrial centres are in a relatively narrow zone between Quebec on the St Lawrence and Windsor, Ontario. Western cities such as Vancouver, Edmonton, and Calgary are, however, becoming increasingly important industrially. The value of Canada's manufactures now exceeds the total value of all her primary products from agriculture, forestry, fishing, trapping, and mining.

CHAPTER V

THE ATLANTIC PROVINCES

I. NEWFOUNDLAND

Introductory

The island of Newfoundland was discovered by Cabot who is said to have landed on its rugged coast in 1497. The strait which separates it from Nova Scotia on the mainland still bears his name. In 1583 it became the first British colony. Few permanent settlements were established though fishermen from many European countries used it as a base, and it was not until 1855 that Newfoundland became self-governing. In 1927, Labrador came under the jurisdiction of Newfoundland. This vast territory includes the north-east coastal area of the Canadian Shield (Fig. 22), and the basin of the Hamilton River which flows east to the Atlantic. Its surface has been eroded by ice and has a network of lakes, many of them long and narrow. In 1949, Newfoundland, with Labrador, became the tenth province of Canada.

The island of Newfoundland is structurally a continuation of the old rocks of the Appalachian Mountains, but it has been detached from the mainland by subsidence and the high ridges, which trend in a north-east to south-west direction, give rise to long peninsulas. Long Range is nearly 2,000 ft in height. The coastline is indented and the undulating interior, which has been greatly eroded by ice, is barren, marshy, or covered by lakes, except in the valleys where thick forests of conifers clothe the slopes. The rivers are swift with many waterfalls.

The sinking of the land has resulted in a broad continental shelf and to the south-east the Grand Banks extend for over 300 miles. The water is nowhere more than 100 fathoms deep and fish abound. It is in this region, to the east of Newfoundland, that the cold current from the coast of Labrador meets the warm drift from the Gulf Stream and the condensation of moisture from the warm damp air causes fog. The prevalence of fog makes fishing difficult, and in June and July, after the partial melting of the ice

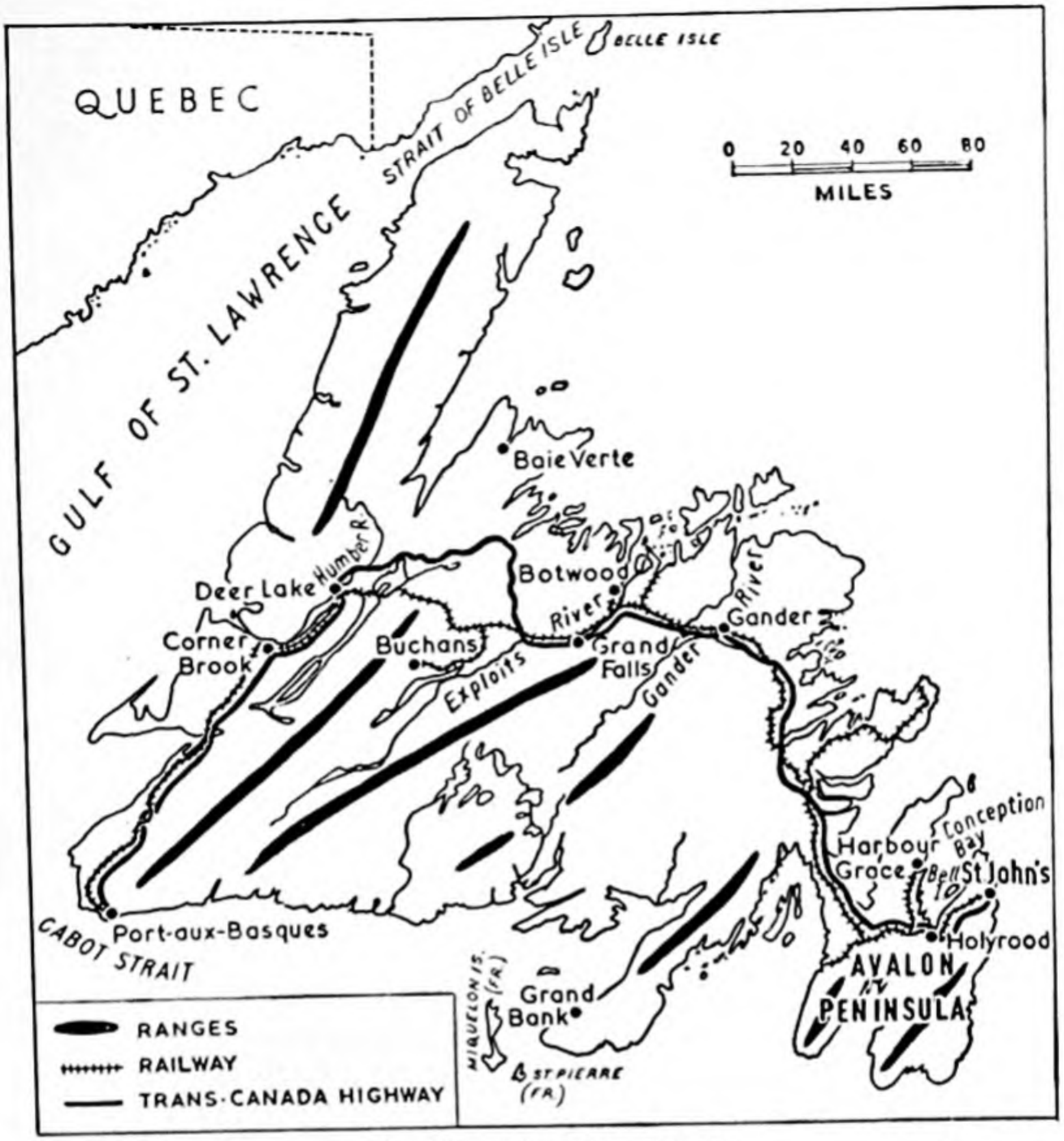


Fig. 16. NEWFOUNDLAND.

sheet over Greenland has caused the margin to break up, icebergs float southwards and merchant shipping has to take a more southerly route.

Occupations

Newfoundland's population of 510,000 depends mainly on mining (iron, zinc, copper, and lead ores, and asbestos fibre), on the manufacture of wood-pulp and paper, and on fishing. It derives power mainly from electricity generated by harnessing the fast-flowing rivers. The largest power station is at Deer Lake on the Humber River.

WOOD-PULP AND PAPER.—The plentiful supplies of soft wood and the situation of Newfoundland, well placed for trade with both Europe and the U.S.A., have resulted in a large and flourishing newsprint industry. There are two main centres—Corner Brook and Grand Falls.

Corner Brook (30,000), the second town of Newfoundland, is centrally situated on the west coast and is the main distributing centre for western Newfoundland. It lies on the estuary of the Humber River (*see* plate opposite) with a deep, sheltered harbour which normally freezes in winter but is kept open by ice-breakers. Power comes from the hydro-electric station at Deer Lake. Wood for the pulp mills, one of the largest centres of its kind in the world, is drawn from the forests all over central and western Newfoundland and is brought in by railway, lorry, and coastal barge. Some is floated down the Humber River. Corner Brook lies on the route of the Trans-Canada Highway.

The mill at *Grand Falls* (7,500) lies on the Exploits River which flows to the north coast. It is connected by rail to the port of *Botwood* (4,000) which has a sheltered harbour on the Bay of Exploits.

The possibility of establishing a third pulp mill in Newfoundland is now being considered.

MINING. Newfoundland has considerable mineral resources of which the most important are rich deposits of iron ore in Labrador (*see* pp. 34-5). Some is exported to Sydney in Cape Breton Island where there are blast furnaces for smelting, using limestone from the west coast of Newfoundland. Considerable quantities of Labrador iron ore are sent to Britain, the U.S.A., Italy, and Japan. Iron ore accounts for three-quarters of Newfoundland's mineral output.

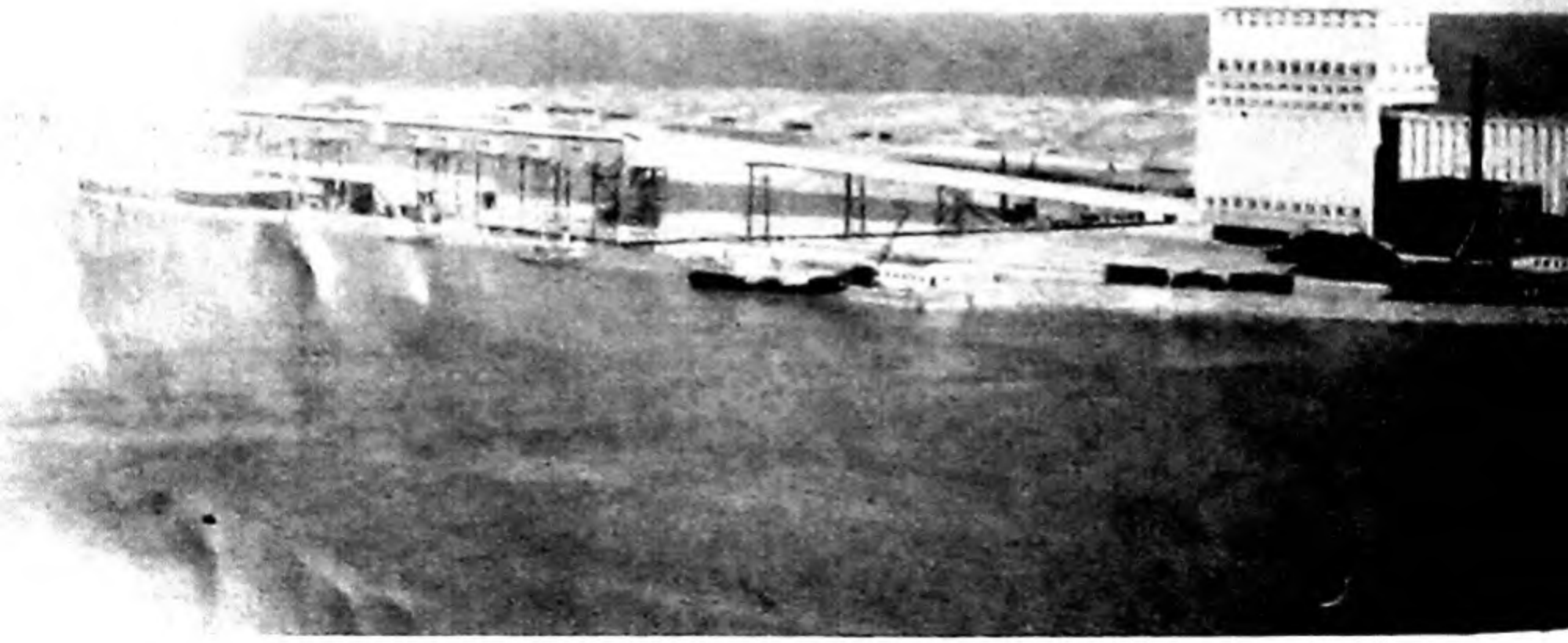
At *Buchans* in the Exploits River valley important copper-lead-zinc ores are worked, mainly for export to the U.S.A., Belgium, and France. Buchans is linked by rail to Botwood from which the ores are shipped.

Asbestos is mined at Belle Verte on the north coast. Power for these mines and for a processing mill comes from Deer Lake.

FISHING.—The cod fishery of the Grand Banks, south-east of Newfoundland has been important for more than 200 years. At one

Above: The Control Tower, Gander Airport, Newfoundland.

Below: Bowater's Pulp and Paper Mills, Corner Brook, Newfoundland.



...on, surrounded by cold and barren northland. (*National Film Board of Canada.*)

...ors at Port Churchill, Manitoba. In the foreground is the Churchill ...kground, Hudson Bay. (*National Film Board of Canada.*)

time the grounds were visited by fleets of schooners from the Maritime Provinces of Canada, the New England ports of Gloucester and Portland (*see* p. 89), and from as far away as Norway and Iceland, but few of these still operate. To-day, most of the fishing is done by inshore trapping or, in late summer and early autumn, by trawling. The fish is salted, dried, and exported, much of it to the West Indies. This type of fishing is carried on mainly by family units. Modern trawlers fish the banks in all seasons for cod, haddock, plaice, and herring to export fresh or frozen to the large cities of the United States and Canada.

Seals are caught off the north-east coast of Newfoundland and along the coast of Labrador, though their numbers have been declining rapidly. Whaling is also done to the north of Newfoundland and the whale meat is used as food for mink and other animals on fur farms.

Salmon from the rivers and lobsters and crabs from the rocky bays around the coast are caught for freezing or canning.

FARMING.—The severe climate, heavy rainfall, and poor soil, restrict farming activities to a few areas and to a limited type of cultivation. The production of cereals is difficult for the average summer temperature does not rise above 16° C. (*60° F.*). Most of the farming, including dairying and poultry raising, is carried on in the Avalon Peninsula, but only potatoes, vegetables, and fodder crops such as hay and roots are at present grown. More extensive farming could be carried on but the attention of the people in prosperous times has always been turned to the sea.

Towns

The main towns of Newfoundland are linked by a railway which runs from St John's in the east to Port-aux-Basques in the south-west. The Trans-Canada Highway follows roughly the same route as the railway (*see* Fig. 16). The main industrial centres have already been mentioned on page 32: other important towns include:

St John's (91,000), the capital and largest city, is the centre for the fishing industry. The chief export is dried cod and imports include, flour, textiles, iron and steel goods, and coal. It is connected with its hinterland by a railway which skirts the north coast and terminates in the south-west, linking the chief lumbering areas and settlements.

Gander (7,200) (*see* plate facing p. 32), which lies east of the Gander River, has an important international airport. Air routes converge on it from Montreal and New York and continue across the 2,000-mile span of the Atlantic to Prestwick airport, near Glasgow, or to Shannon airport in the west of Eire. Gander is used by the British Overseas Airways Corporation and by American trans-Atlantic services to Britain and Europe.

Port-aux-Basques (6,000) is the western terminus of Newfoundland's main railway and road system, and the chief port of entry from the mainland. Road travellers on the Trans-Canada Highway transfer to ferry boat at Port-aux-Basques for the 100-mile sea crossing to North Sydney on Cape Breton Island, a journey which takes eight hours.

Grand Bank on the Burin Peninsula is the headquarters of the Bank Fishery.

Holyrood in Conception Bay has an oil refinery dealing mainly with petroleum from Venezuela.

Labrador

The coast of Labrador, together with the basin of the Hamilton River, is politically a dependency of Newfoundland. Rugged, barren, and very sparsely peopled, it is too isolated and bleak to attract many settlers, but some Eskimos, Indians, and even Europeans, live along the coast by hunting and fishing. The total permanent population is about 21,000 of whom 800 are Eskimos.

Cod fishing provides the chief source of livelihood, and for this hundreds of Newfoundland fishermen visit the coast in summer. Many parts of the highland interior are still unexplored, though a few settlers and Indians engage in fur trapping and bring their pelts back to the coast settlements.

Rich deposits of high-grade iron ore exist near the source of the Hamilton River on the border with Quebec. During recent years there have been rapid developments in this ironfield. A 300-mile railway was constructed to link Knob Lake and Schefferville on the northern border of Labrador (*see* Fig. 17) with the ports of Seven Islands (Sept Isles) and Pointe Noire on the northern shore of the St Lawrence estuary, and a branch line now runs to the open-pit mines of the Wabush Lake area. These railways provide an outlet for the iron ore which can be sent direct via the St Lawrence

Seaway and Great Lakes to some of the great industrial centres of Canada and the United States. Iron ore is also exported to Britain, Italy, and Japan. To supply power to the mining areas a tributary of the Hamilton River has been harnessed near Grand Falls to generate electricity. There are plans to build a large power station on the Hamilton River itself at Grand Falls, which have a drop greater than Niagara.

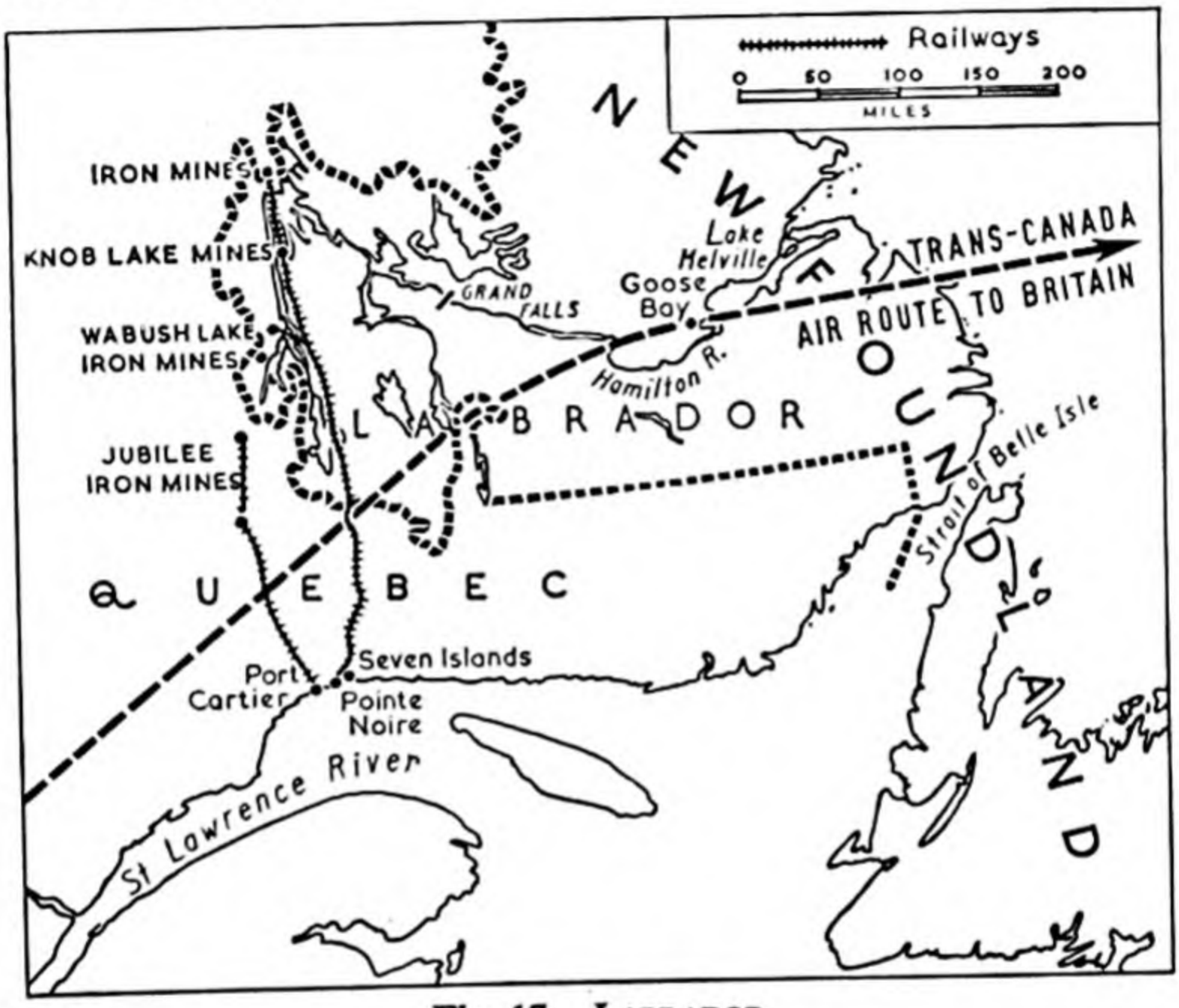


Fig. 17. LABRADOR.

The ore at Wabush is concentrated into pellets to reduce transport costs. When mined the ore contains about 36 per cent. of iron. The concentrate which is sent away contains 66 per cent. The main settlements on this ironfield are the *City of Wabush*, *Labrador City* and *Julian*.

There are rich deposits of uranium north-east of Goose Bay and many valuable deposits of copper, silver, lead, and zinc exist in the Hamilton River valley but these have not yet been developed.

Goose Bay (2,500), near the head of Hamilton Inlet, is a large airport on the shortest land-to-land route to Europe. It is

sometimes used as an alternative to Gander when the latter is affected by fog, but it is costly to operate since it cannot be approached by ship for at least seven months in the year, and must therefore be serviced by air. The main route using Goose Bay operates between Montreal and Glasgow (Prestwick).

II. PRINCE EDWARD ISLAND, NOVA SCOTIA, AND NEW BRUNSWICK

Prince Edward Island (110,000), Nova Scotia with Cape Breton Island (765,000), and New Brunswick (630,000) lie south of the estuary of the St Lawrence, facing the Atlantic Ocean.

Physical Characteristics

The old hard rocks of the Atlantic Provinces form a northern extension of the Appalachian Mountains, deeply dissected by valleys which have a south-west to north-east trend. Between these valleys which, together with the coastal areas, are the only parts suitable for farming, lie broad infertile plateaux with small lakes, swamps, and forests. The region has been heavily glaciated and the subsequent sinking of the land surface has given rise to a broad continental shelf which includes the Grand Banks, south of Newfoundland, and the shallow Bay of Fundy. Many of the valleys have been submerged, giving rise to an indented coastline, and areas have been detached to form Cape Breton Island and Prince Edward Island; Nova Scotia itself is only connected to the mainland by a relatively narrow isthmus.

Climate

Winters are cold along the east coast of Canada owing to the presence of the Labrador current. Halifax has a mean January temperature of −4° C. (*24° F.*). The shores of the Bay of Fundy, however, are warmer, for they are sheltered from cold north winds and are less affected by cold currents. Summer temperatures in July and August are over 16° C. (*60° F.*).

Precipitation is heavy, with a maximum in winter; Halifax has an annual rainfall of 57 inches.

Occupations

Industry is the chief source of wealth in the Atlantic Provinces of the mainland. This is largely the result of the natural resources: fish is processed, pulp and paper made from the forest trees, timber goes through the saw mills, and iron and steel are produced on the coalfield. The main occupations apart from industry are mining, fishing, and farming—in that order.

(*a*) MINING.—There are coalfields in Nova Scotia around Sydney in Cape Breton Island. The coal is mined under the sea and is used for fuelling ships and for export to St Lawrence ports, but in winter the supplies must be stored until the river is free from ice. Other mines operate on the west coast of Cape Breton Island and in the Pictou and Cumberland districts of Nova Scotia. Markets for coal in eastern Canada have been declining since natural gas and oil have been piped eastwards from Alberta (*see* Fig. 15, p. 28). To-day, Nova Scotia coalfields are uneconomic and there is unemployment among the miners.

At Sydney on the Cape Breton coalfield, and at Trenton on the Pictou coalfield, there are steel works. Iron ore is imported from Newfoundland and limestone is available locally. Iron, manganese, lead, zinc, silver, and copper are found in the north of New Brunswick, and Nova Scotia produces barytes and gypsum. A vein of tin ore in the south of New Brunswick is now being developed. It is the only known deposit of tin in North America.

(*b*) FISHING is important, especially along the cold, barren eastern coast of Nova Scotia, where there are many small harbours, though even this industry is declining. Cod, herring, mackerel, and haddock are caught, salmon are obtained from the rivers, and in recent years lobster fishing has developed along the rocky coastline of the south-east. The value of the lobster fisheries now exceeds that of the cod fisheries. Lobsters are caught and canned on the coast of Prince Edward Island and young herring, so called "sardines", along the coast of New Brunswick. Lunenberg and Halifax have fishing fleets.

(*c*) FARMING.—Farming is carried on in favoured parts, but over much of the region the soil is too poor. The west coast of Nova Scotia is noted for its fruit. Parallel with the shores of the Bay of Fundy, between Windsor and Digby, lies the long, narrow Annapolis Valley with soft red rocks which weather to a fertile soil, well


NEW
BRUNSWICK
SCOTIA

Dairying is carried on throughout the Atlantic Provinces wherever the land is good enough.

In the north of the Bay of Fundy, which has the highest tides in the world, great deposits of silt have accumulated, and the early settlers built dykes and drained these alluvial lands which now produce fine crops of hay. This is good dairy farming country and so are the valleys of New Brunswick; the crops, mainly roots, clover, and hay, are grown to provide winter fodder for the stock. Apples flourish in the sheltered valley of the fertile St John River. But Prince Edward Island is the province most suited to farming for it has a fertile red soil excellent for crops. Eighty-five per cent. of the farmland is arable. Potatoes are by far the most important crop, especially seed potatoes which are sent all over Canada. Oats, hay, and roots are grown and dairying is well established. Some pigs are raised.

Fur farming is a notable occupation. Many years ago pioneer farms were set up to see if furs could be economically produced from animals kept in captivity. The experiments were successful and there are now over two thousand farms scattered over Canada breeding mink, fox, chinchilla, and other animals.

The standard of living in New Brunswick and Prince Edward Island is a good deal lower than in the rest of Canada and there has been a movement of population westward in recent years.

(*d*) LUMBERING.—The forests contain spruce, pine, fir, and cedar, and for more than a hundred years they have been exploited for their timber, especially in New Brunswick which was at one time densely forested. The finest trees, however, have already been felled and the hard board, pulp and paper industries are now more important. The mills operate near rivers and use hydro-electricity as a source of power.

Transport

The Canadian National Railway has its eastern terminus at Halifax, and an eastward extension of the Canadian Pacific Railway links St John with Montreal.

The most significant development in recent years has been the building of the Trans-Canada Highway. The Newfoundland section is linked by ferry from Port-aux-Basques with North Sydney on Cape Breton Island. In order to reach Nova Scotia a causeway had

to be constructed across the Canso Strait which separates the two provinces. This was a major engineering task because huge tides burst through this narrow funnel and ice jams are a menace in late spring. However, vast quantities of rock were poured into the 200-ft deep channel and a causeway was made with locks which permit ships to use the strait.

There are plans to construct a tunnel and a bridge to link Prince Edward Island with the mainland.

Towns

Halifax (200,000), the capital of Nova Scotia, has the advantage over Quebec and Montreal of being ice-free and it can therefore serve as the chief winter port for trans-Atlantic shipping. It has extensive shipyards, an oil refinery, and processing industries.

St John (92,000), the chief city of New Brunswick, has a fine ice-free harbour on the Bay of Fundy which is much used in winter when the St Lawrence is frozen. It has a dry dock, oil refinery, and sugar refinery.

Fredericton (22,500), the capital of New Brunswick, is situated at the limit of navigation of the St John River.

Moncton (46,000), is the centre of a dairy farming area in the east of New Brunswick and a natural focus for road and rail routes.

Charlottetown (18,500), the capital and port of Prince Edward Island, is situated on the southern coast and is connected by ferry with the mainland. It is a market centre for a rich agricultural hinterland.

Lunenberg, south of Halifax, has long been established as the main base for Canada's North Atlantic fishing fleet and it has a large and modern fish processing plant.

Truro (13,250), at the head of the Bay of Fundy, has a carpet industry.

Sydney (34,000), the chief city of Cape Breton Island, is a coal-mining centre with large steel works.

CHAPTER VI

THE ST LAWRENCE VALLEY AND GREAT LAKES REGION

The Great Lakes and St Lawrence Seaway

Southern Quebec and Ontario owe much of their prosperity to the cheap transport between Lake Superior and the Atlantic afforded by the Great Lakes and St Lawrence Seaway. The Straits of Belle Isle on the St Lawrence estuary are linked by river, lake, and canal to the western shores of Lake Superior, over 2,000 miles into the interior of the continent. This route—the Great Lakes-St Lawrence Seaway—is used from mid-March to the end of December for the export of farm produce and for the transport of raw materials to manufacturing centres. In winter the Seaway is frozen.

Grain from the prairies is brought by rail to the terminal ports of Fort William and Port Arthur on Lake Superior, the largest freshwater lake in the world. Here it is stored in elevators and loaded by pipe into grain-carrying ships for passage through the Lakes (*see* plate facing p. 49). The first obstacle is encountered in the rapids at Sault St Marie, where the water from Lake Superior falls 20 ft to Lake Huron. The famous Soo canals allow ships to pass this point, and the traffic exceeds that of Suez or Panama. *Sault St Marie* has important steel works.

Lake Huron is linked with Lake Erie by the navigable St Clair River and Lake, and the Detroit River, but between Lake Erie and Lake Ontario are the 160-ft high Niagara Falls. These are divided into two separate falls by Goat Island and they form a magnificent spectacle visited by up to 2 million tourists every year (*see* plate facing p. 97). To avoid the Falls, the Welland Canal was constructed in 1829 and has since been enlarged. There is a difference in level of 326 ft between the two lakes and seven locks are necessary, each providing a lift of over 46 ft.

Lake Ontario is still well above the level of the St Lawrence below Montreal. Between these points a section of the Seaway nearly 200 miles long includes eight locks, each 800 ft long, with

a navigable depth of 27 ft. Ocean going ships can now carry their cargoes from the Atlantic to the ports of the Great Lakes. Iron ore from Labrador and Newfoundland is carried to the steel centres of Hamilton and Cleveland, steel from Cleveland is taken to the car manufacturing centres of Windsor, Toronto, and Detroit, and ship-building has been made possible near the centres of steel production.

The water impounded to make the Seaway provides cheap hydro-electric power which is shared between Canada and the U.S.A.

Cargoes passing eastward from the United States port of Duluth on Lake Superior consist mainly of grain and iron ore. Much of the iron ore is unloaded at ports on Lake Erie for smelting at Cleveland, Pittsburgh, or Buffalo. Products for export proceed via the Erie Canal to New York. Other canals which provide useful waterways are the Rideau Canal from Lake Ontario to the Ottawa River, and the Illinois Canal linking Lake Michigan with the Illinois tributary of the Mississippi.

The St Lawrence lowlands and the Lake Peninsula, which lie south of the Canadian Shield, in Quebec and Ontario, are the most densely peopled areas in Canada. The two provinces have a combined population of over 13 million. They contain the chief industrial centres with over four-fifths of the developed water-power, and include fine dairying land which yields milk for butter and cheese making, both being exported. The provinces lead also in the production of timber and furs.

The St Lawrence Valley

The St Lawrence Valley forms a narrow strip between the Shield to the north-west and the rocks of the Appalachian system to the south-east. It is covered in many parts by glacial drift.

As far as Montreal the lowlands lie in the province of Quebec, a region originally settled by French immigrants. There are now over 4 million French Canadians, more than four-fifths of the population of the province. Many of them are Catholic farmers and few of them speak or write English; French is the official language in the schools, law courts, and provincial Parliament. Their numbers are steadily increasing and these French Canadians are very conscious indeed of their separate identity.

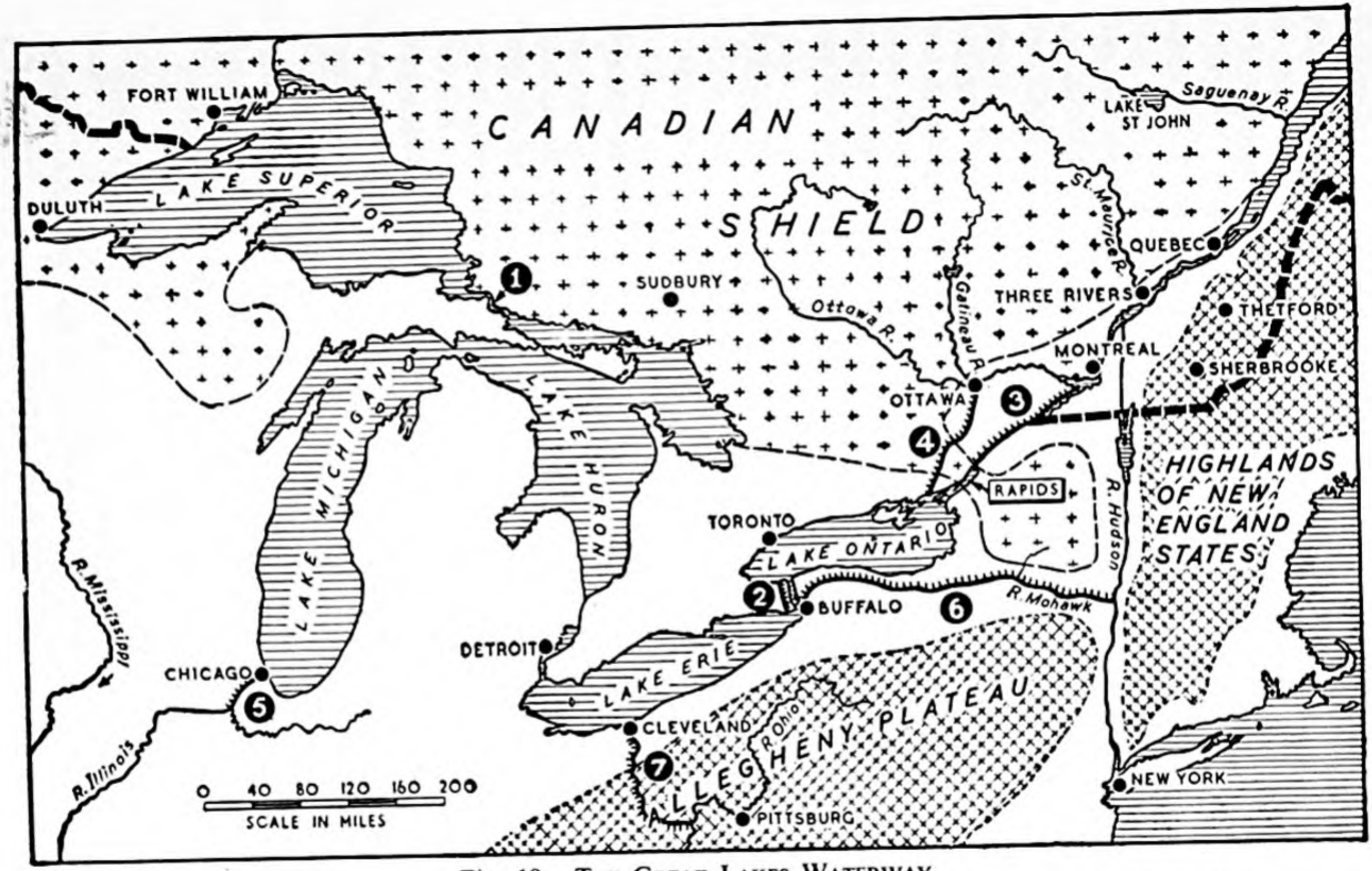


Fig. 19. THE GREAT LAKES WATERWAY.

1. Sault St Marie or "Soo" Canal. 2. Welland Canal. 3. St Lawrence Seaway. 4. Rideau Canal. 5. Illinois Canal. 6. Erie Canal. 7. Canal linking Cleveland and the Ohio River.

Farming

Along the St Lawrence and its tributary streams, particularly on the southern side, the land is divided into strips running at right angles to the river banks where the villages are situated. It is a mixed farming region, dairying being particularly important. Cheese and butter are made. Potatoes are grown and fodder crops occupy a large acreage of the arable land as the dairy cattle have to be fed indoors throughout the long cold winters. Tobacco and sugar-beet are also grown. In spring the farmers collect the sap of the maple tree in the wooded parts to prepare syrup and sugar.

North of the St Lawrence lie the hard rocks of the Canadian Shield, and it is only along the tributary valleys that settlement has proved possible. Dairying is carried on in the small fertile area around Lake St John in the Saguenay River Basin, and some farming is done where the forests have been cleared in the valleys of the St Maurice and Ottawa rivers.

Fur farming, especially for mink, is important in both Quebec and Ontario.

Lumbering

The coniferous forests, particularly in Quebec, yield soft-wood timber and the raw material for great pulp or newsprint mills.

The lumberjacks, many of them farmers who can leave their families to look after their cattle during the winter, set off for the forests in the autumn or "fall". They establish themselves in log huts which they build for winter quarters. Selected trees are cut down and dragged over the frozen ground to the nearest river where they are stacked until the spring. When the thaw sets in the logs are floated downstream, precautions being taken to see that they do not "jam" against the river banks. Skilled men are employed to guide the logs on their journey to the saw and pulp mills which are usually situated where water-power is available. The demand for newsprint is increasing. Quebec produces more than half of Canada's wood-pulp, much of which goes to the U.S.A.

The main centres of the pulp-wood industry lie near the fast rivers which flow from the Canadian Shield and which provide cheap hydro-electric power. They include the valleys of the Ottawa, Gatineau, St Maurice, and Saguenay rivers.

Industries

Apart from the paper and pulp industry, manufacturing of all kinds has become increasingly important with the development of hydro-electric power and the improvements in transport. Electricity is used for the manufacture of aluminium from bauxite imported from Guyana and Jamaica, and the output of aluminium has expanded enormously to meet the demands of the aircraft industry. The chief centre is at *Arvida* in the Saguenay valley which has the largest aluminium smelter in the world.

Small textile mills are scattered throughout the region, but the major industries are concentrated in the larger towns. Unlike Britain, the textile industry in Canada is not centred on definite localities, nor is it specialised. Transport was so difficult in the early days of settlement that small mills sprang up to supply local needs, mainly on streams of soft water flowing from the hard rocks of the Shield. There are hundreds of mills in Quebec and Ontario; each mill is self-contained and operates processes for spinning, weaving, dyeing, and finishing. Woollen mills are the most important; raw cotton from America is imported and manufactured, and the rayon industry uses locally prepared wood-pulp. The woollen and cotton industries are now declining a little as fabrics made from synthetic fibres become more important. *Cornwall,* on the St Lawrence Seaway, has a large synthetic fibre (nylon) industry.

Industry first grew most rapidly in Ontario but of recent years the number of industrial workers in the province of Quebec has doubled, and many new industries have been established.

Towns

The towns of the St Lawrence lowlands have grown from early Indian or French settlements on or near the river, many of them where tributaries enter from the Shield area to the north.

Montreal (2,300,000), Canada's largest city and chief commercial and industrial centre, grew up on an island in the St Lawrence where it is joined by the Ottawa River—a site easily defended. The people are mainly French-speaking. Montreal, which is still growing rapidly, is at the focus of great natural routes:—

(*a*) To the Great Lakes along the St Lawrence Seaway;

(*b*) To the Atlantic by the navigable river;

(*c*) To Western Canada by the Ottawa River valley;

(*d*) To New York by the gap formed by the valleys of the Richelieu and Hudson.

Railways follow these routes from Montreal which is the headquarters of both trans-continental railway systems.

As a port it has the disadvantage of being closed for ten weeks in winter when the St Lawrence freezes but it is, nevertheless, one

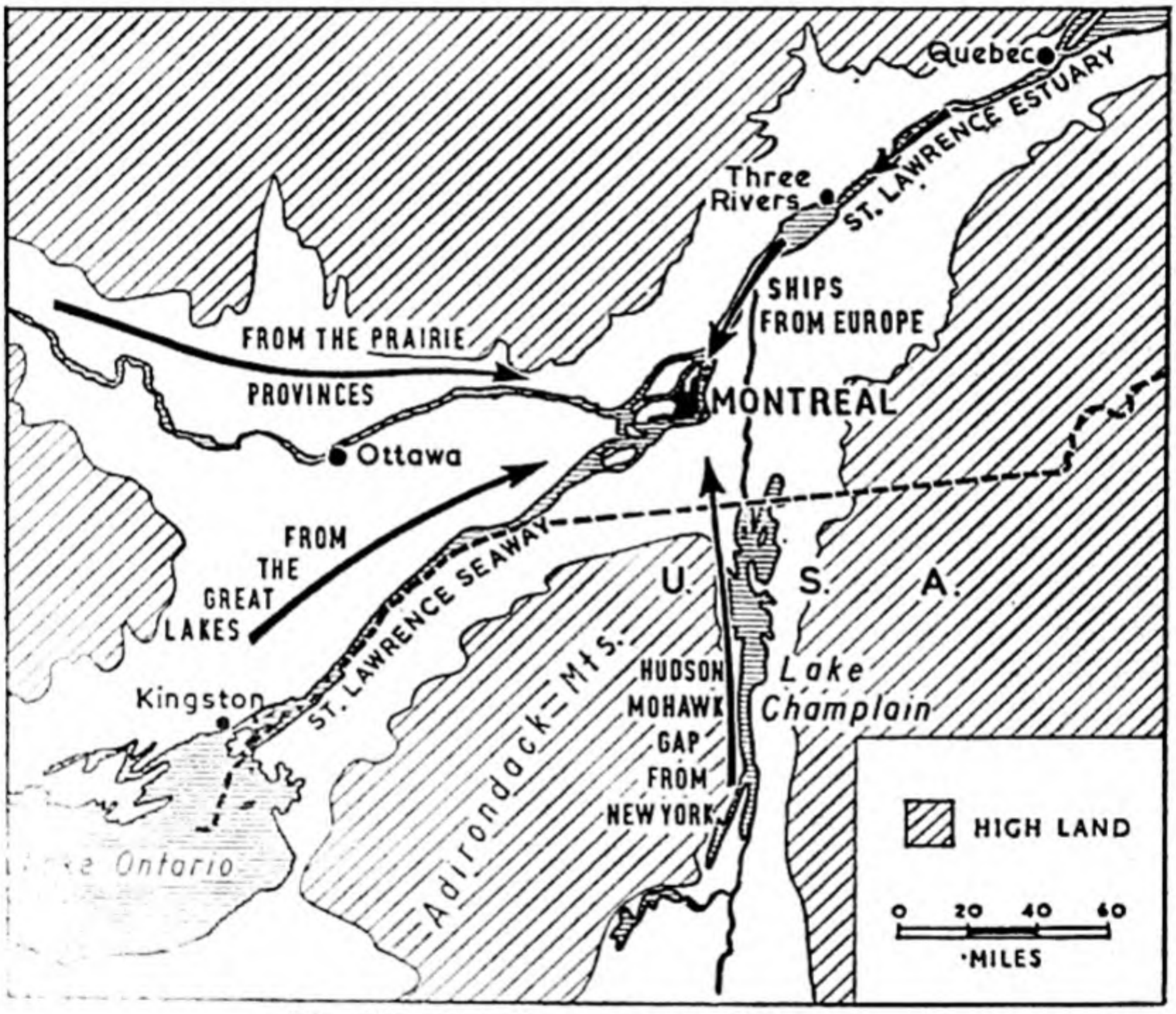


Fig. 20. THE POSITION OF MONTREAL.

of the world's greatest ports, a terminus for trans-Atlantic passenger liners, and a grain storage and export centre. There is a large international airport and the city is served by a newly constructed underground railway. Industries include the manufacture of boots, clothing, and paper. It has railway, shipbuilding, aircraft, and engineering works.

East of Montreal lies a densely peopled region which includes some of the richest agricultural land in the country, farmed mainly

by English-speaking farmers. The towns of the region are known as the "Eastern townships", of which *Sherbrooke* (67,000), a textile town, is the largest. Further north lies *Thetford* (22,000), the centre of a district which produces 70 per cent. of the world's asbestos. There are valuable copper mines near Murdochville on the Gaspé peninsula.

Quebec (392,000), 400 miles up the St Lawrence River, was founded on the site of an old Indian village by the French explorer Champlain. For over 150 years it remained French until it passed into the hands of the British in 1763, four years after it had been conquered by Wolfe. For many years it was the capital of the country; now, as the capital of Quebec province, it is still a typically French city. The largest liners are accommodated at Quebec, for it has the highest tides of the St Lawrence estuary. It is the first point where the river is crossed by railway.

Using hydro-electric power from the Montmorency Falls the city manufactures pulp and paper, boots and shoes, machinery, cutlery, ropes. Shipbuilding is also important. Timber and wood-pulp are its chief exports.

Three Rivers (58,500), another old French settlement, is a centre of the lumbering industry, and the largest newsprint manufacturing centre in the world. The timber is floated down the St Maurice River from the Laurentian Plateau and the Shawinigan Falls provide electricity for the mills and textile factories. Great aluminium smelting plants deal with imported bauxite (the "ore" of aluminium). This industry has enormously increased its output with the expansion of the aircraft industry.

Sorel (17,000), between Three Rivers and Montreal, is sited where the River Richelieu enters the St Lawrence. It is noted for its shipbuilding yards and is also a grain port.

Seven Islands (20,000), once a small fishing village, is the terminus of the railway which brings iron ore from Labrador (*see* pp. 34-5 and plate facing p. 48) for shipment to the steel towns of Canada and the U.S.A. *Pointe Noire* on the same bay is also an iron ore port.

Baie Comeau (8,000) is a developing industrial town and port on the St Lawrence estuary with an aluminium plant and paper mill.

Shawinigan Falls (25,000) is a centre for the manufacture of pulp and paper.

Ottawa (495,000), with the Dominion Parliament Buildings standing on a crag overlooking the Ottawa River, is the Federal Capital of Canada. The forested areas of tributary valleys which converge on the city provide timber for its saw mills and pulp factories which use power from the Chaudiere Falls.

Ottawa is linked with Kingston on Lake Ontario by the Rideau canal, and the chief rail routes from eastern Canada pass through the city before striking across the sparsely peopled country north of the Great Lakes towards the Prairies.

The Ontario Peninsula

The Peninsula, sometimes known as the Niagara or Lake Peninsula, lies between the Shield in the north-east, and Lakes Huron, Erie, and Ontario. It is the most southerly area in Canada, and is divided by the Niagara escarpment which runs from Lake Erie to Lake Ontario and gives rise to the famous Niagara Falls.

The region is densely settled, for it is one of the most fertile farming areas in Canada. It has a relatively mild climate due to the proximity of the Lakes, a warmer summer than most of the country owing to its southerly latitude, and a good soil partly composed of glacial deposits.

Mixed farming and dairying predominate. Ontario is the chief province for the production of cheese, butter, and condensed and powdered milk. Pure-bred cattle, sheep, and pigs are bred on Ontario farms.

Wheat, oats, and barley grow well, but production cannot compete with the prairie regions for export trade. Fruit growing is important. Apples, pears, and plums are grown throughout, but in Southern Ontario, where the higher land slopes towards the shores of Lake Erie, grapes, figs, peaches, and apricots flourish and melons and tomatoes are produced. Electric railways, using power from Niagara, link the orchards with the local towns. Sugar-beet is grown and tobacco is cultivated so successfully that there is now a considerable export.

Ontario is the chief manufacturing province, largely because cheap electric power, developed mainly under public ownership, is

Above: Track and tunnel under construction for the Quebec North Shore and Labrador Railway. (*National Film Board of Canada.*)

Below: The port of Seven Islands on the St. Lawrence River. In the foreground the terminal of the Quebec North Shore and Labrador Railway and facilities for the loading of iron ore into ships. In the background the town. (*High Commissioner for Canada*)

Great Lakes Grain Movement. A grain boat being loaded with wheat at a terminal at Port Arthur. As much of the grain as possible must be rushed to the ports before the lakes freeze up in December. (*National Film Board of Canada.*)

Wheat Still "coming in," near Edmonton, Alberta. It is harvest time in the prairie wheatlands around. (*George Hunter, Ottawa.*)

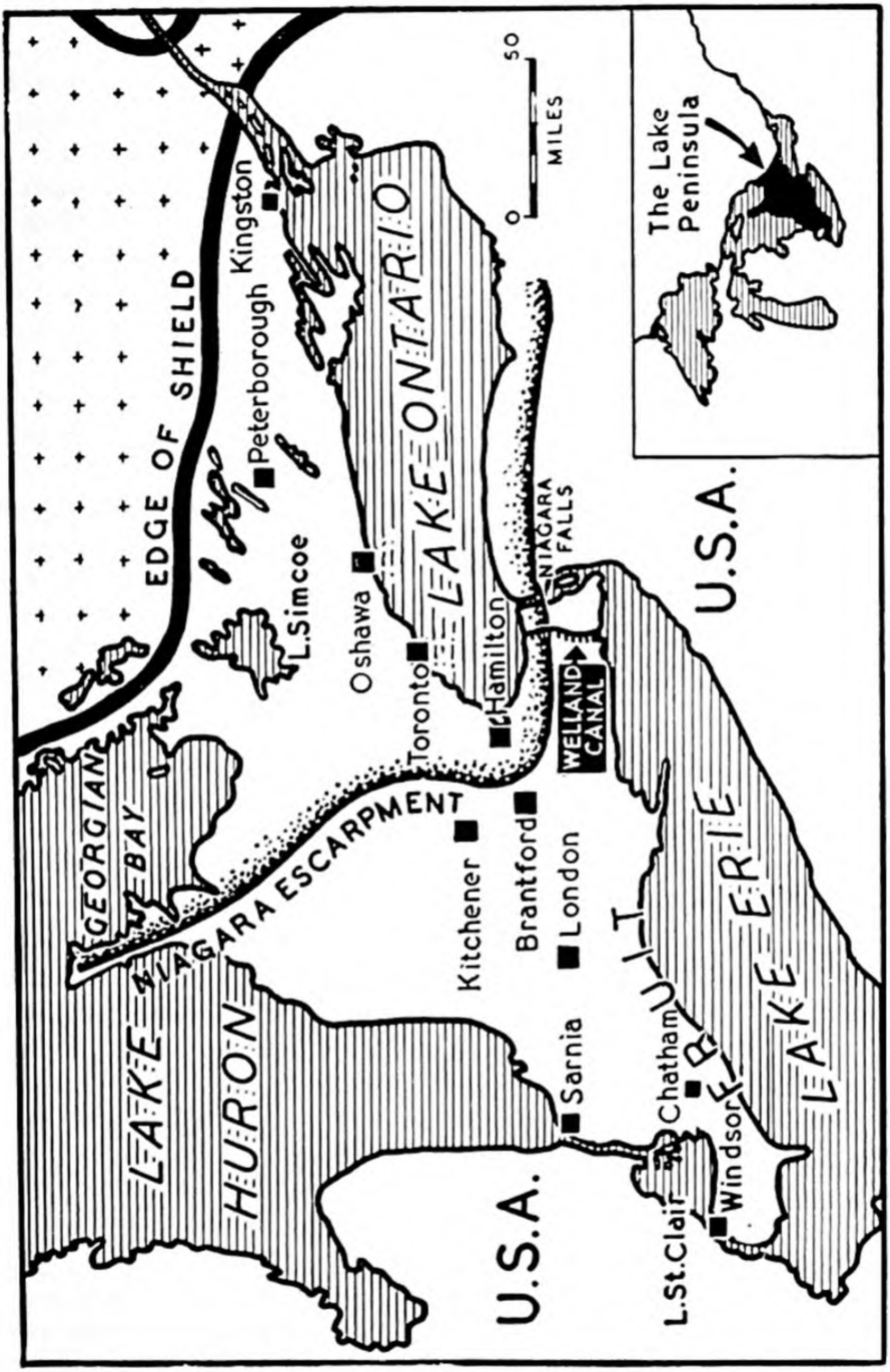


Fig. 21. The Ontario or Lake Peninsula Showing Chief Industrial Towns.

abundant and because the Great Lakes form a main highway for transporting raw materials and finished products.

Most of the electricity is generated from water-power although some lakeside towns use imported coal. Canada's first nuclear power station is at Douglas Point on the eastern shore of Lake Huron. On the main highway which runs around the western shores of Lake Ontario between Niagara Falls and Oshawa the factories stand side by side for mile after mile making "almost everything that Canadians eat, wear, use, drive, or make for export". This rich industrial area is sometimes called the "Golden Horseshoe".

Towns

The chief manufacturing towns of Ontaria are Toronto, Hamilton, Windsor, Sarnia, Oshawa, and Kingston.

Toronto (2,160,000), an industrial city, is capital of Ontario province. It was built on the site of an old fortress on the southern shore of Lake Ontario and is a good lake port which also controls the land route to the fertile lake peninsula. Toronto is one of the most rapidly expanding cities in the world. It is a great financial and commercial centre and second only to Montreal in industrial output, making cars, aircraft, machinery, and electrical equipment.

Hamilton (450,000), a port at the western end of the lake, is "the Birmingham of Canada", with iron and steel works providing material for making agricultural and textile machinery, and motor cars. It is near to the iron ore of Minnesota and the coal of Pennsylvania. Other industries include the manufacture of electrical equipment, pottery, hosiery, and chemicals.

Windsor (212,000), opposite the American city of Detroit, engages in the same industry—the manufacture of motor cars.

Sarnia (51,000) is the terminus of an oil pipeline from Alberta. It has oil refineries and chemical industries based on the by products —the making of synthetic rubber, acoustic tiles, plastics, etc.

Oshawa (78,000), on Lake Ontario, makes motor cars.

Kingston (59,000) has a modern rolling mill for making aluminium sheets for aeroplane construction.

These towns are all on the lake shores. Inland towns include *London* (208,000), a financial and industrial centre, *Brantford* (59,000) which makes farm implements, and *Kitchener* (195,000) which manufactures motor tyres, furniture, and food products.

5239

CHAPTER VII

THE CANADIAN SHIELD

Physical Features

The Canadian or Laurentian Shield consists of a mass of very old hard rock (*see* plate facing p. 17), extending from the Great Lakes and St Lawrence River in the south to the Arctic Ocean in the north, and bounded on the west by a line of large lakes extending from Great Bear Lake to Lake Winnipeg and Lake Superior. The region was greatly eroded during the Ice Age and in many parts, especially round the shores of Hudson Bay, the rocks are covered with glacial clays. Thousands of lakes, large and small, fill hollows in the rock surfaces and these are linked by streams or rivers; an Indian in his canoe can travel from the Great Lakes to the Arctic with very few portages. Many of the rivers have large waterfalls which provide water-power used in the St Lawrence Valley and elsewhere to generate electricity. The southern parts of the Shield are forested wherever there is sufficient soil; in the north are the so-called Barren Lands—the tundra, where mosses and scrub provide pasture for the herds of caribou, which provide the main source of food for the Indian inhabitants of northern Canada.

Economic Development

THE FUR TRADE.—The exploration of the Shield began with the rise of the fur trade, and as early as the seventeenth century the Hudson Bay Company had started fur trading with the Indian population. Since then the numbers of forest Indians have decreased and many white trappers are well established in the region. Most of the trapping is done in winter, for then the animals grow thicker and finer coats. The trappers still travel mainly by dog sledge and snow-shoe in winter and by canoe in summer. The furs of fox, otter, martin, beaver, and mink are most important, and these are taken to trading posts, which are very widely scattered over the Shield area. They are maintained by the Hudson Bay Company, which trades with the Eskimos and Indians and generally organises the transport of supplies—often using "snow bugs", little vans fitted with caterpillar tracks and skis. The largest number of pelts

is taken in the Prairie Provinces but many of these are muskrat and squirrel. The most valuable pelts come from Ontario where mink and beaver predominate. In bulk, the furs are usually taken by air to Montreal or Winnipeg and then despatched to London or New York—the world's chief fur markets. The trappers face strong competition from fur farmers in the more accessible areas of Ontario, Quebec, and the Maritime Provinces; furs from farms in Canada exceed in value those obtained by trapping.

WOOD-PULP AND PAPER.—The forest areas yield valuable timber in the valleys which lead to the St Lawrence and there are wood-pulp and paper industries, especially where hydro-electric power is available (*see* pp. 44-5). Further west the forested parts are too inaccessible for lumbering on a large scale.

FARMING.—Farming on the Shield is only possible where glacial deposits remain in hollows or where there are beds of old lakes from which the water has drained away. The largest glacial clay belt extends east and west from Cochrane where potatoes, vegetables, and dairying are important. The land around Lake Abitibi has been settled by farming communities for many years. The best farmland in the north-west is around Fort Simpson.

Freshwater fisheries in the many lakes of the Canadian Shield are becoming increasingly important, providing employment for the Indian and Eskimo people. The chief fishing lakes are Lake Winnipeg, Lake Winnipegosis, Lake Athabasca, and Great Slave Lake, though as many as 600 lakes in all are fished commercially.

MINERAL WEALTH.—The Canadian Shield is most important for its valuable mineral resources. The southern parts of Quebec, Ontario, and Manitoba have yielded useful minerals since the construction of railways provided transport facilities to the mining centres; some mines have been working for very many years. In the North-West Territories, which have always been inaccessible, prospecting and exploitation are still in their early stages, but vast mineral wealth has been proved and with air transport development is rapidy proceeding. At present minerals which are valuable in relation to their weight are mainly exploited—gold, silver, and uranium.

The southern area includes several regions of importance. The Timmins-Porcupine area has always been important for gold mining. It produces most of Canada's gold and is second only to the gold-bearing reefs of South Africa in annual production. In

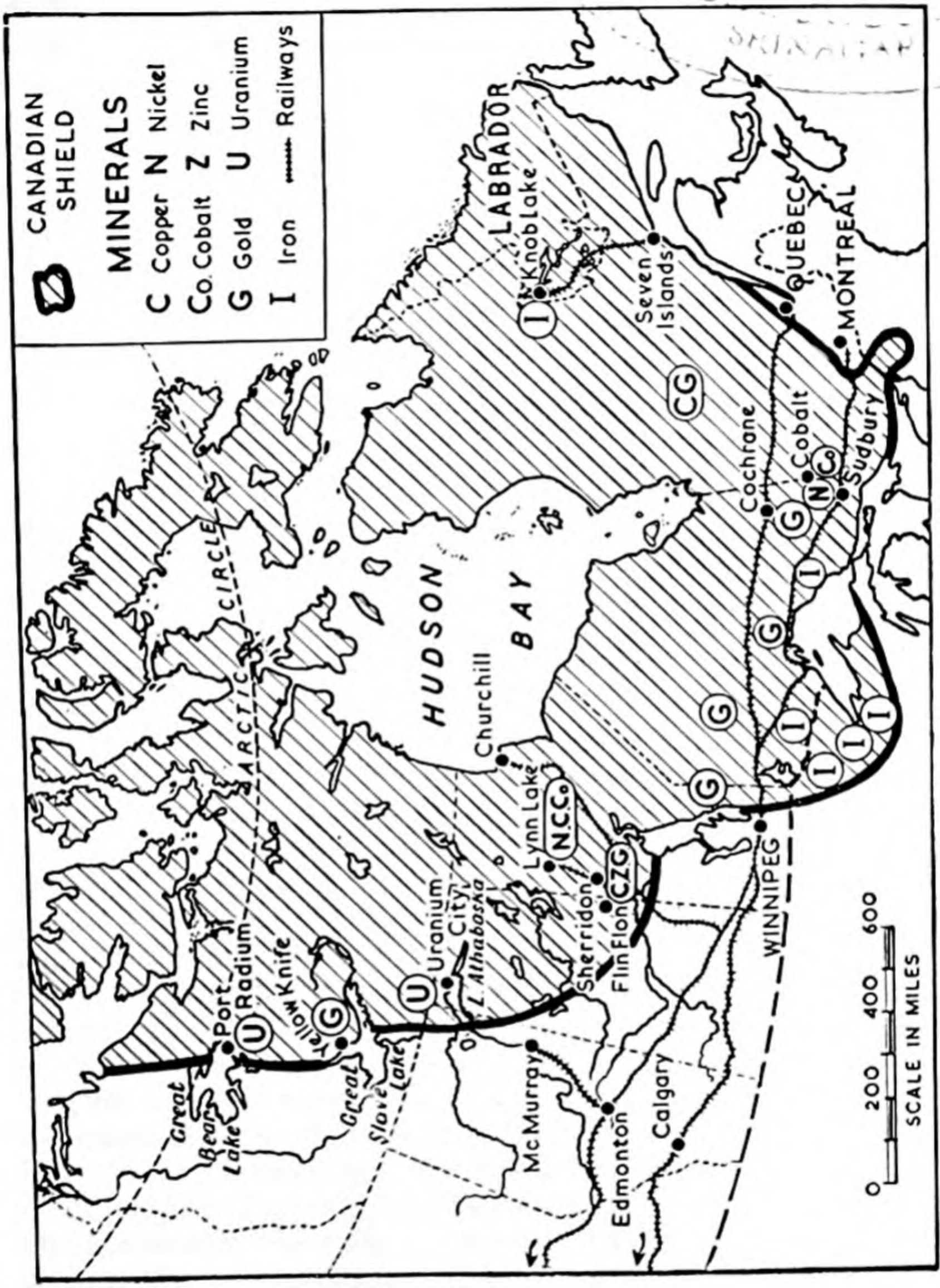


Fig. 22. The Canadian Shield.

1964 ores of zinc, copper and silver were found and mines are developing rapidly. At *Sudbury* are deposits of nickel ore which yield over 50 per cent. of the world's supply, and cobalt, copper, silver, gold, and platinum are derived from the same deposits. These ores are smelted and refined near the mines. Uranium is found at Elliot Lake about 80 miles west of Sudbury.

Iron ore at Steep Rock and Michipicoten, near the northern shores of Lake Superior, is sent to the famous Algoma steel plant at Sault St Marie where it is smelted, using coal from the U.S.A. Iron is also obtained from north Quebec at Lac Jeannine, west of the main Labrador ironfields (p. 35) and a railway has been built to Port Cartier, west of Seven Islands on the St Lawrence.

A group of mining areas in Manitoba and Saskatchewan are served by branch lines from the Hudson Bay railway which was constructed to provide an outlet for the rich agricultural lands of the Prairies. These include Flin-Flon (11,000), Sherridon, and Lynn Lake. Copper is the main ore obtained from these centres, but nickel, gold, silver, and zinc are all produced. Sherridon has declined as a mining town while Lynn Lake has grown.

Uranium ores, which yield the radio-active materials used in atomic engineering, are found in Ontario, in northern Saskatchewan (Uranium City on Lake Athabaska), and at Port Radium by Great Bear Lake in the Northern Territories.

Gold, silver, and copper are mined in the Great Bear Lake and Coppermine areas, and there is a goldfield at Yellowknife on the shores of Great Slave Lake. Gold has also been found at Lake Contwoyto, north-east of Yellowknife. The heavier ores of copper and silver are piled up during winter and transported by water during the short summer season. Lead and zinc are obtained from open pits at Pine Point, south of Great Slave Lake. The town is linked by rail with Edmonton. The Mackenzie River and its tributaries form useful navigable waterways; between the railhead at McMurray and Inuvik on the Arctic coast the only hindrance to water transport consists of a series of rapids near Fort Smith. A short road now links the navigable stretches. At Fort Smith on the Slave River a shipyard constructs barges for transporting the ores, and Norman has oil wells and a refinery which supplies petroleum for mining machinery, river boats, and aeroplanes.

Prospecting continues both for oil and for copper, gold, silver, and uranium along the Arctic coast, especially around Coppermine,

but the exploitation of these minerals will depend on transport facilities. Rich deposits of iron ore have been discovered near the Yukon border and in Baffin Island.

Life in many of the remote mining settlements in the north is hard. The winters are long and dark. From August until April most food must be imported, though caribou, ptarmigan, and rabbits can sometimes be obtained. At times the temperature falls below −50° C. (*−60° F.*). Long hours must be spent indoors and the sense of being always "shut-in" gives settlers what is commonly known as "cabin-fever".

The summers, on the other hand, are short. In May, June, and July there is almost continuous daylight with high temperatures. Everything grows luxuriantly. Spring, summer, and autumn plants all bloom together and vegetables grow to an enormous size. But summer has its irritations: plagues of deer-flies, black-flies, and mosquitoes drive men to distraction.

Indians and Eskimos now take a part in the development of the Canadian north and their traditional ways of life are changing (*see* pp. 3-5). Mining in the Yukon and North-West Territories would have been almost impossible without the use of air transport. There are now regular air lines from Edmonton to Dawson in the Yukon and to Inuvik and Coppermine near the Arctic coast; private and charter planes connect many of the more isolated settlements. Hydroplanes which can alight on the many lakes or rivers are used in summer, and when the lakes are frozen in the winter the planes are fitted with skis for landing on ice. Helicopters are widely used. Prospectors had proved the presence of valuable minerals long before the pioneers of air transport started to carry mining equipment to the north. To-day thousands of tons of equipment are carried by air each year to the remote settlements of this area.

Roads are increasing in importance. The Alaska Highway has formed the chief route to the Yukon for heavy trucks since the war of 1939-45. It links the railhead at Fort St John with the town of Whitehorse. The Mackenzie Highway links Peace River with Hay River on Great Slave Lake, and from Hay River it is possible in summer to reach the Arctic coastline by tugboat along the Mackenzie River. A railway follows the same route and continues to Pine Point where lead and zinc are obtained from surface workings. Great Slave Lake can also be reached from Fort McMurray by using the navigable Athabasca and Slave rivers. Some 200,000 tons of

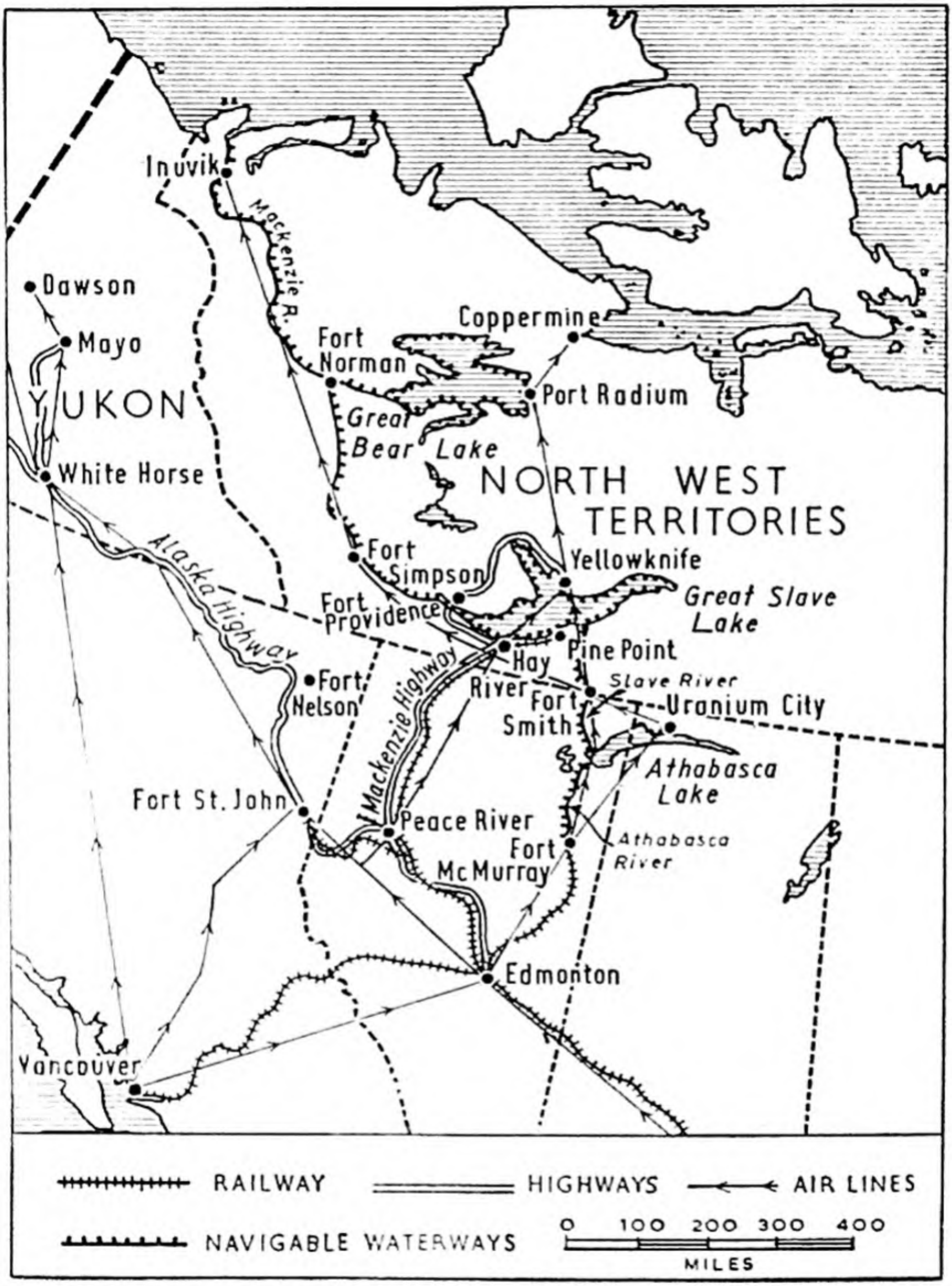


Fig. 23. Routes to North-west Canada.

freight are handled each year on the Athabasca River during the short June-September shipping season.

Transport is difficult in the winter when the navigable rivers are frozen but large diesel caterpillar snow tractors are used to haul equipment and supplies on sledges to the northern trading posts. These tractor trains or "cat sweeps" use powerful searchlights at night to find their way across the barren rock and frozen muskeg. They can carry twenty passengers and seventy tons of freight.

Towns

Sudbury (118,000) is near one of the most productive mining areas in Canada which yields nickel, copper, silver, and gold. It is on the route of the Canadian Pacific Railway and serves an area where alluvial soils make dairy and mixed farming possible.

Fort William (45,000) and *Port Arthur* (45,000) on Lake Superior have large grain elevators for storing wheat ready for export via the Great Lakes-St Lawrence Seaway. Iron ore is also shipped from the mines at Steep Rock and the ports have shipyards, pulp and paper mills, and aircraft and car factories.

Yellowknife (3,500) is the largest settlement in the North-West Territories. It started in 1935 as a gold-mining centre on Great Slave Lake and is now reached by the Mackenzie Highway or the Great Slave Lake railway, and lake steamer from Hay River.

Fort Simpson is a fur-trading centre on the Mackenzie River.

Inuvik (2,250) is Canada's largest town within the Arctic Circle. It is a naval base and the administrative centre for the extreme north-west.

The Political Future of the Northern Territories

The western part of the Northern Territories is becoming so important for mineral development that the Canadian Parliament is considering the possibility of separating this area from the eastern part and of giving it local self-government with a capital at Fort Smith. It would be called the Mackenzie Territory. The area to the east would become Nunassiaq and would continue to be governed from Ottawa.

CHAPTER VIII

THE PRAIRIES

Physical Divisions

The temperate grasslands or Prairies of Canada lie between the Rocky Mountains on the west and the Canadian Shield on the east, and occupy the southern parts of Manitoba, Saskatchewan, and Alberta. These are usually known as the Prairie Provinces but the more extensive northern parts are sparsely forested. The

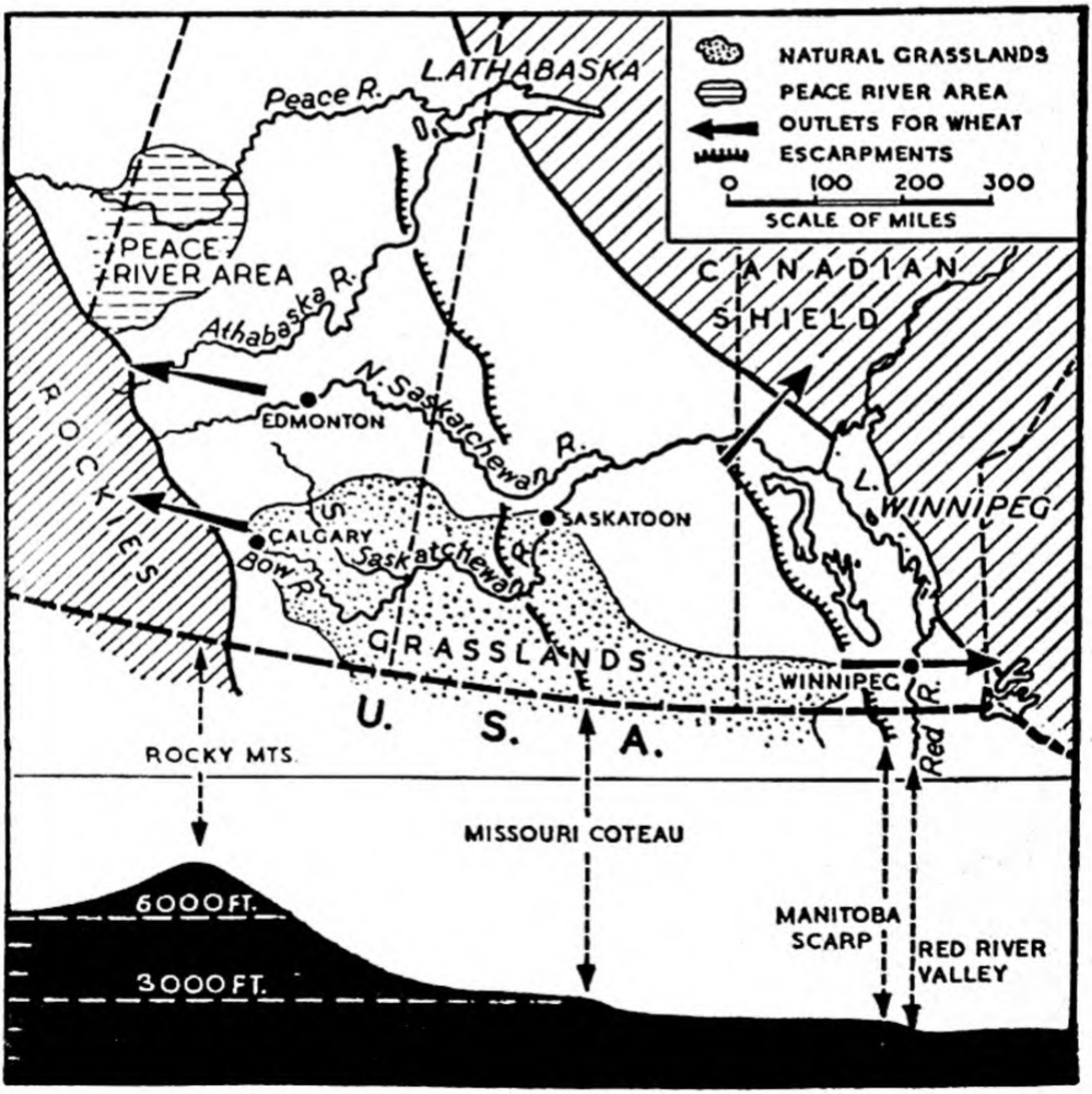


Fig. 24. The Prairie Provinces of Canada.

region is divided into three undulating plains by fairly definite escarpments (*see* map and section, Fig. 24), each with its characteristic type of farming.

(1) The low prairies of Manitoba, less than 1,000 ft in height, occupy a region which, towards the close of the Ice Age, was covered by a large lake. As the ice retreated and the water drained away a rich glacial soil was left. Lake Winnipeg and Lake Winnipegosis still remain. The region is very fertile, especially in the Red River Valley, where wheat growing and mixed farming are important.

(2) The middle prairies of western Manitoba and eastern Saskatchewan are separated from this region by the Manitoba scarp. They have an average height of over 2,000 ft and a rainfall of 12-15 in. per annum. This is a noted wheat-growing region.

(3) The high prairies of western Saskatchewan and Alberta lie between the escarpment known as the Missouri Coteau and the Rockies. The rainfall is scanty and cattle ranching is the chief occupation. Drought-resisting varieties of wheat are grown in more favoured parts and irrigation schemes in Southern Alberta (*e.g.* Bow River Valley) have brought large tracts of land into cultivation.

The Wheatlands

The most rapid development of the Prairies took place between 1900 and 1920. A network of railways was constructed and settlers came to plough up the cheap, virgin land and grow wheat. Conditions are ideal for this crop and the prairie region still produces vast quantities of grain.

Much of the prairie land is divided into "townships" six miles square which are in turn divided into square mile sections. A typical farm may be a half or quarter section but there is a tendency for farms to become larger.

In spring, when the thaw sets in about April, the ground is prepared and a hard variety of wheat is sown. The moisture from the melted snow and frost gives it a good start, and spring and early summer rains assist it in earlier growth. The soil is heavy and holds the root firmly so that despite the weight of the full ear, the straw is not easily flattened by wind or rain. The summers are hot for ripening the grain, which is usually harvested about the middle of August. The undulating country provides good drainage,

but is flat enough for the use of machinery on a large scale. Combine harvesters cut and thresh the grain simultaneously, and it is usually sent away at once. Wheat is Canada's chief agricultural export. Unfortunately the best export routes are closed by ice in the autumn and the railways are unable to deal with the great quantities of grain rapidly enough, so that much of it must be stored in elevators at the stations.

The grain is exported by the following routes: —

(i) By rail to the twin ports of Fort William and Port Arthur on Lake Superior, often known as the "Canadian Lakehead". Here the grain is loaded on to ships which pass through the Lakes and the St Lawrence Seaway. The St Lawrence is closed by ice in winter. Some of the wheat from the Lakes is sent via the Erie Canal and Hudson River to New York for export.

(ii) By rail to ports on the Pacific coast (Vancouver, New Westminster, or Prince Rupert) and thence to China, now one of Canada's main buyers of wheat. The wheat which goes by sea to Europe is taken via the Panama Canal. It is a long route but unlike the route from the St Lawrence ports, is open all the year.

(iii) By rail to St John (New Brunswick) or Halifax (Nova Scotia) which are normally ice-free in winter.

(iv) By rail to Churchill on Hudson Bay and then direct to Europe. This is the shortest and most direct route but it is open only until October, after which Hudson Bay freezes. All the grain exported by this route must be despatched within a few weeks of harvesting.

Wheat is by no means the only crop of the Prairies. Oats and barley are grown in areas which are not warm enough for wheat, and sugar-beet is produced on irrigated lands in the south of Alberta and Manitoba. Dairying is carried on, especially in the damper eastern parts, and root crops, lucerne, and hay are grown for winter fodder. There is, indeed, a tendency to establish more and more mixed farms. The farmers have realised the folly of attempting to put all their eggs in one basket. For years wheat growing paid well and despite relatively low rainfall the land yielded good crops. Land was ploughed which was really only suitable for dry grazing, and wheat was grown year after year on the same land, so that the soil gradually became impoverished. Some farmers bought new land and moved on, leaving their old farms derelict. In 1932 came

the world depression. Wheat prices dropped and the Prairie farmers were among the first to suffer, for the distance from the sea inevitably involves high transport costs.

Vigorous measures have been taken to prevent further damage to the land. Mixed farming is increasing in importance, a proper rotation of crops is being introduced, light land is being put down as pasture and disease-resisting wheats have been developed. Moreover, soil erosion is reduced by planting trees, or Siberian broom, to break the force of the wind and prevent soil drift. Fields are ploughed in narrow strips for the same reason. There are many hazards to be faced by the wheat farmer: hail, frost, drought, and grasshoppers can all do serious damage to their crops.

The development of breeds of wheat which will ripen in a shorter period has resulted in a northward extension of the wheat-growing lands, and some of the land to the north of the natural grasslands has been cleared of its poplar and spruce and cultivated. Perhaps the most noteworthy is the Peace River area (*see* Fig. 24), which is reached by rail from Edmonton. Wheat is grown as far north as latitude 58° N., where the growing season is little more than 120 days. The longer hours of daylight, however, help to compensate and early maturing types of wheat ripen in about 100 days.

Cattle and Sheep Ranching

Cattle and sheep are raised in large numbers in southern Saskatchewan and in Alberta. The rainfall over the wheat-growing Prairies ranges between 16 and 20 in. per annum; in Alberta it is lighter. The air is clear and dry and the land rises towards the Rocky Mountains in the west, forming wide open "plains" particularly suitable for cattle ranching. The grass, however, is relatively poor and the ranches are large, often several thousand acres. Pigs (hogs) are also important. The warm dry Chinook winds from the Rockies (*see* p. 15) make it possible for the cattle to remain out all the year round, though it is necessary to feed them with hay from sleighs drawn by tractor when snow is deep on the ground.

Mineral Wealth

Apart from the minerals obtained from the Shield area of northern Saskatchewan and Manitoba (*see* Chapter VII), few metallic ores are found in the Prairie Provinces though great reserves of

potash, over 3,000 ft underground, are being mined in a wide belt stretching from east to west across Saskatchewan (*see* Fig. 24A). The main belts lie east of Saskatoon and around Regina. A new process in which hot water is used to dissolve the potash which is then brought to the surface in solution makes it possible to exploit deposits up to 6,000 ft below the surface. The output of potash is increasing and Saskatchewan will soon supply about one quarter of the world demand.

There are great coalfields along the eastern flank of the Rocky Mountains in Alberta. The province is not only self-sufficient

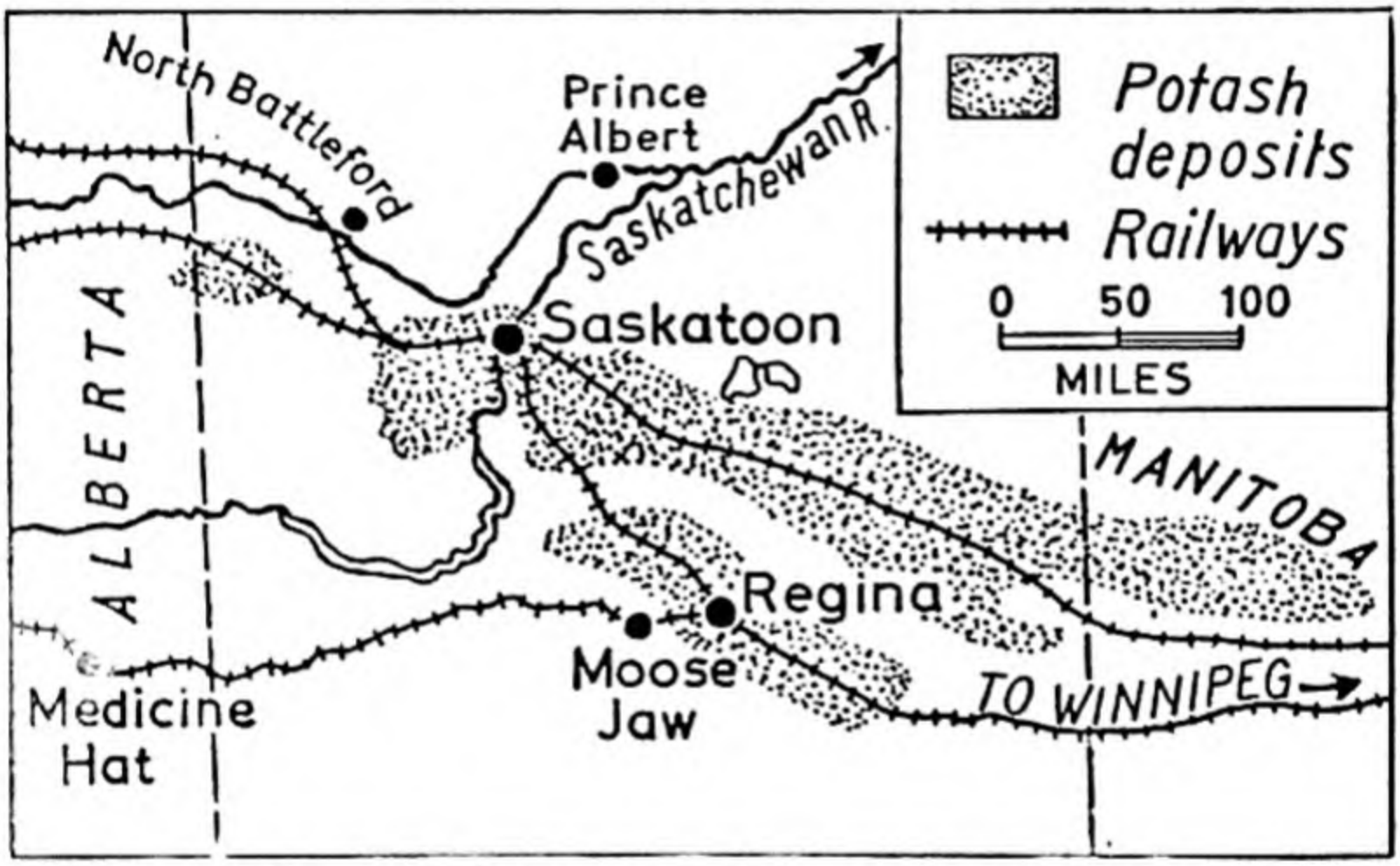


Fig. 24A. THE PHOSPHATE DEPOSITS OF THE PRAIRIES.

in coal, but is able to send a surplus to Saskatchewan and Manitoba (*see* Fig. 14, p. 27). Some of the coal mined near Calgary is of poor quality (lignite), but good bituminous coal is obtained near the Crow's Nest Pass and near Edmonton.

There are also valuable oilfields in Alberta, and smaller ones in Saskatchewan and Manitoba. The first oil was discovered in the Turner Valley, near Calgary, as long ago as 1914, but by 1940 production began to wane. In the 1950's new oilfields were developed in several other localities in Alberta, notably in the Redwater area, north of Edmonton, and in the Leduc and Pembina areas, south-west of the city. A pipeline takes the oil to Sarnia on the Lake Peninsula where there is a refinery (Fig. 15, p. 28), and

crude oil is also piped through the Rocky Mountains to Vancouver and Washington State.

Natural gas is associated with petroleum in the oilfields of Alberta and Saskatchewan and is piped to the eastern provinces of Canada to provide heat and power to large industrial cities such as Toronto. A pipeline also takes natural gas across the Rockies to Vancouver where it links up with the pipelines of the Pacific States of the U.S.A.

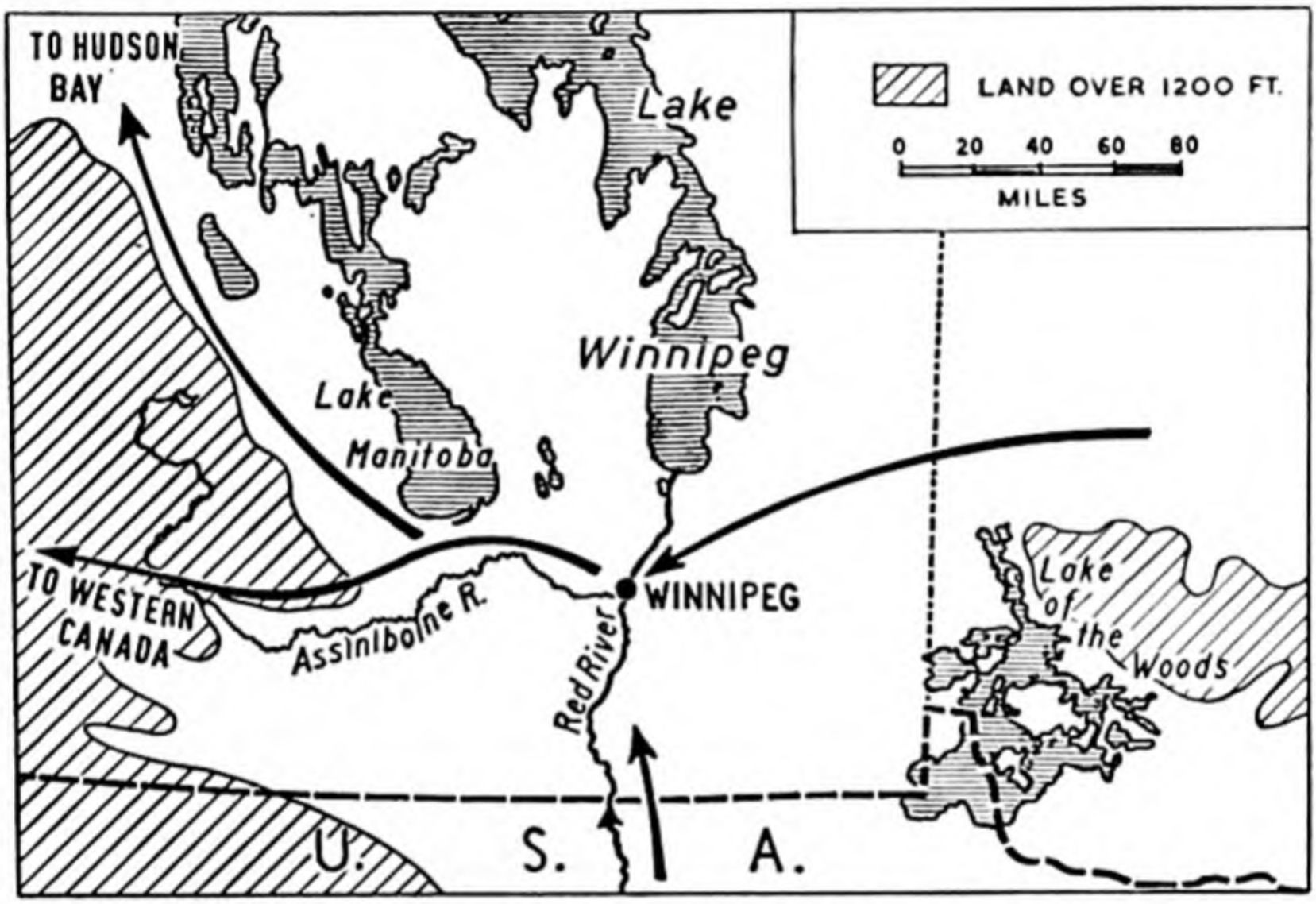


Fig. 25. THE POSITION OF WINNIPEG.

Edmonton, Calgary, Medicine Hat, and other towns use the natural gas from the Alberta oilfields for domestic and industrial purposes. In some places sulphur is extracted from the natural gas; production is already up to 120,000 tons a year. Chemical industries based on petroleum and natural gas are also important, especially in the Edmonton area where synthetic yarns are made.

In the Athabasca River valley around Fort McMurray, some 250 miles north of Edmonton, are extensive deposits of soft sandstones impregnated with bitumen—the "Athabasca Tar Sands of Alberta". These have been known for years to contain vast reserves of oil but the problem has been to separate the sand grains from the bitumen.

This problem has now been solved. A hot-water process successfully separates the oil. However, until the general demand for oil increases, it is not likely that large quantities will be extracted.

Iron ore is known to exist in the Peace River district of northwestern Alberta and with local coal conditions favour the setting up of a steel industry.

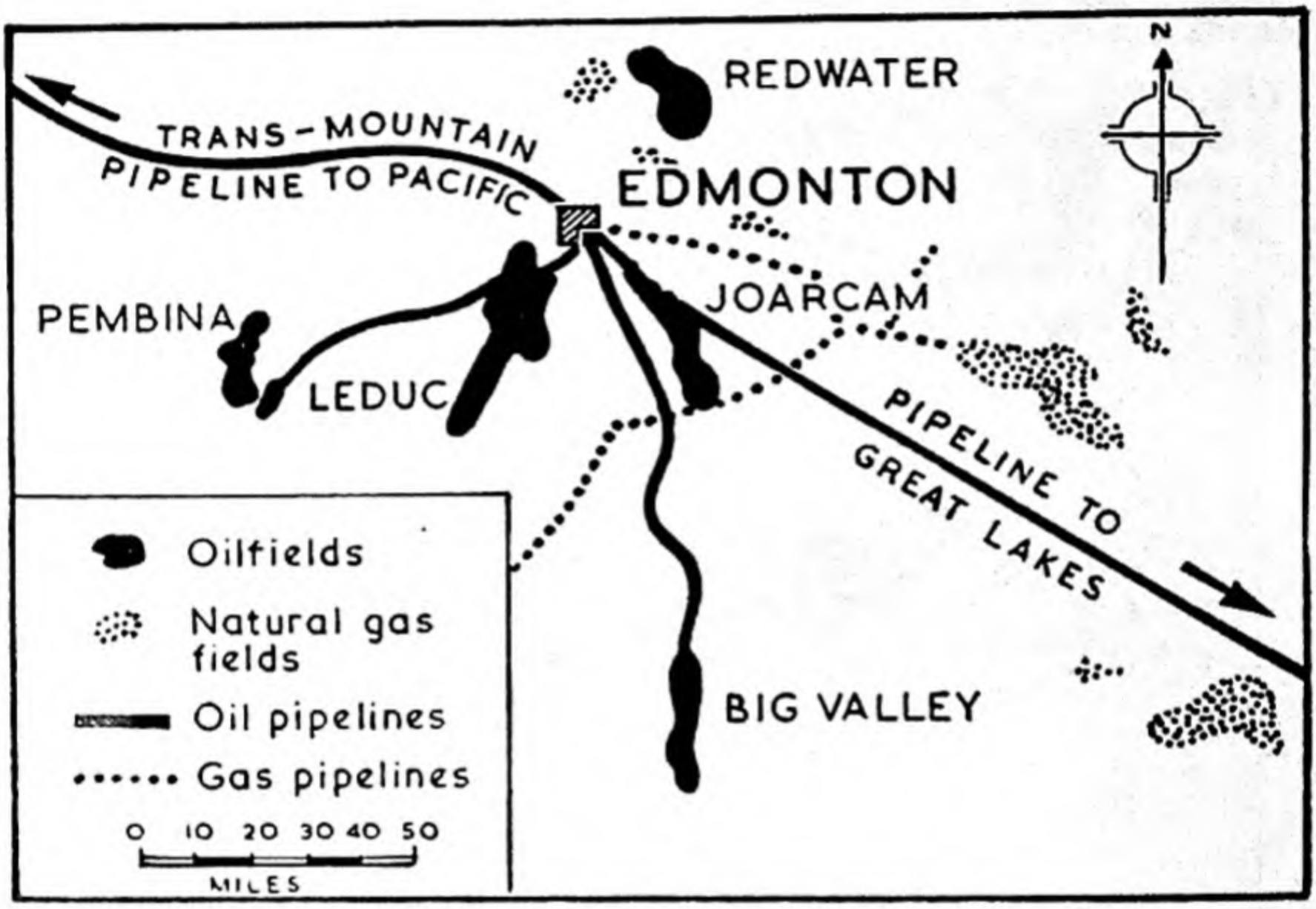


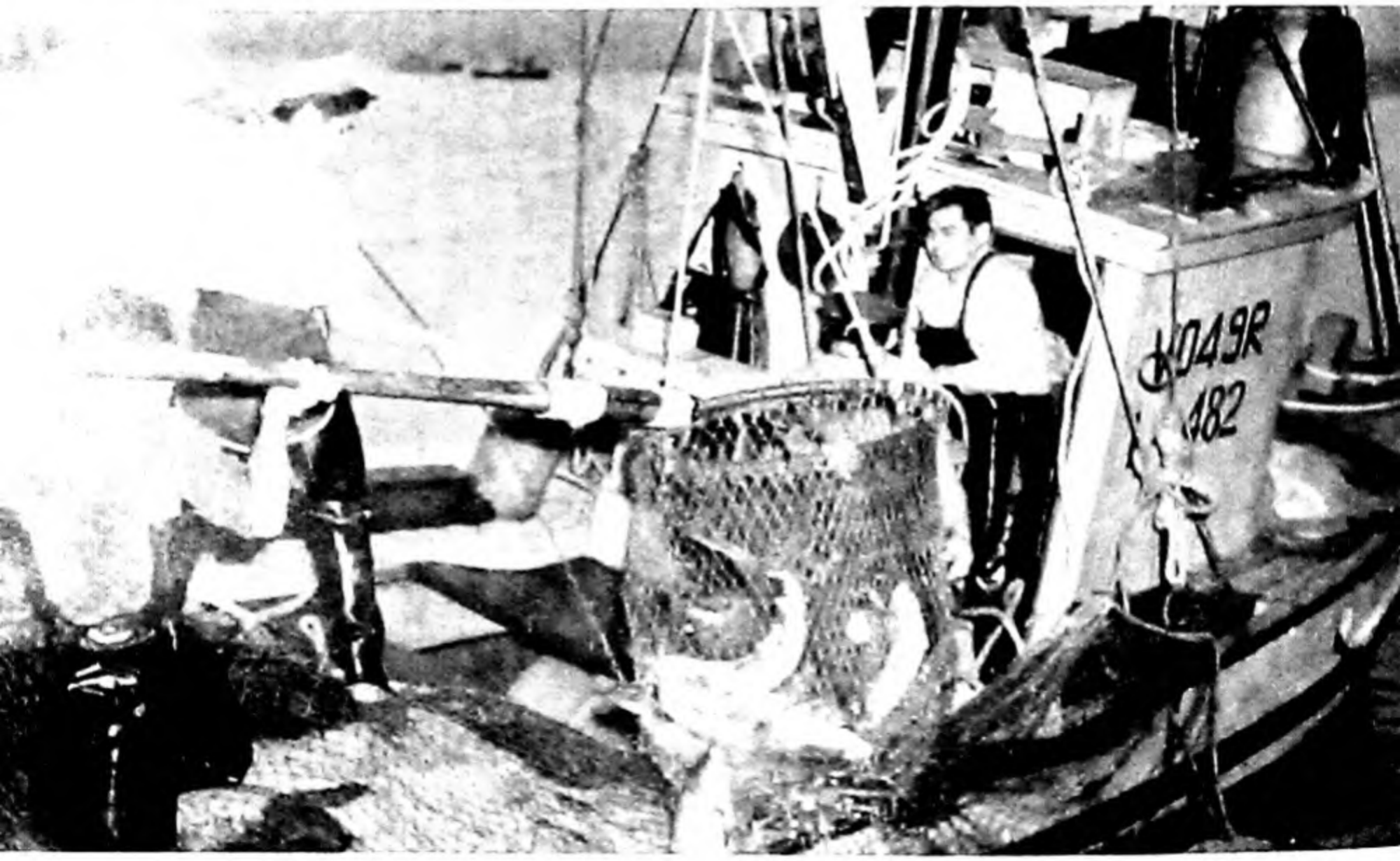
Fig. 26. OILFIELDS OF THE EDMONTON DISTRICT.

Towns of the Prairie Provinces

Winnipeg (510,000), capital of Manitoba and the largest city of the Prairie Provinces, is sited at a bridge point on the Red River where it is joined by the Assiniboine River. This was an important centre for the fur trade over one hundred years ago when it started to grow as a Hudson Bay Company post—Port Garry. Its present name Winnipeg comes from a Cree Indian phrase win-nipig or "murky water". The coming of the trans-continental railway in 1885 made it a great grain and distributing centre. The city lies between the United States boundary and Lake Winnipeg and is a natural focus for transport routes. The east-west routes are forced to run north of the Lake of the Woods and south of Lake Winnipeg

Above: The Rockies—a glacier on Mount Chilco, B.C. Note the medial moraine. *(High Commissioner for Canada.)*

Below: Vancouver, B.C., Canada's third largest city. *(George Hunter, Ottawa.)*



Above. A general view of Alcan's smelter plant at Kitimat, British Columbia. (*Aluminium Company of Canada*.)

Below. Salmon fishermen on the British Columbia coast "brailing" their catch, *i.e.*

and to cross the Red River at a convenient bridge point. To-day, road, rail, and air routes converge on Winnipeg which is also an industrial centre with flour mills and factories which make agricultural machinery.

Regina (131,000), the capital of Saskatchewan, is also an important grain centre and has a wide range of industry including potash mining, oil refining, and the manufacture of steel.

Calgary (355,000) on the Bow River is the market centre for a large agricultural and stock raising area. It has extensive stock yards and meat packing plants. Nearby coal and oil have given rise to other industries including the manufacture of chemical fertilisers. The Canadian Pacific Railway passes westward through Calgary and Banff to the Kicking Horse Pass and Vancouver.

Edmonton (438,000), Alberta's capital and largest city, is a market town serving an important farming area and the great oil centre of Canada (Fig. 26). It is the terminus for oil pipelines to the Pacific coast and to the Great Lakes and eastern Canada which are fed by the nearby Redwater, Leduc, and Pembina oilfields. Edmonton is also the gateway to northern Canada (Fig. 23) with railways to Fort St John, Peace River, and Fort McMurray which link it with highways and waterways to the Yukon and the Arctic coast. It is linked by railway to Vancouver via the Yellowhead Pass. Air traffic with northern mining centres is particularly important. Edmonton manufactures aircraft and has important petro-chemical industries, based on oil and natural gas, which produce synthetic fibres, polythene sheeting, and plastics. Edmonton and Calgary have grown more rapidly in recent years than any other Canadian cities, largely owing to their proximity to the developing oilfields.

Moose Jaw (35,000) has oil refineries, cold storage plants, and grain elevators and *Saskatoon* (116,000) collects grain from the prairie ploughlands.

CHAPTER IX

WESTERN CANADA: BRITISH COLUMBIA AND THE YUKON

Relief

Most of British Columbia lies to the west of the high range of the Rocky Mountains which forms a barrier to communication, broken by three main passes—the Yellowhead, the Kicking Horse, and the Crow's Nest. All three are used by railways. Between the Rockies and the coast are a number of more or less parallel ranges and valleys. Many of these valleys are lake-filled, and from one of these the Columbia River flows south into the United States; from another flows its tributary, the Okanagan, and from a third the Fraser, the chief river of British Columbia. The many swift rivers of British Columbia provide water-power resources second only to Quebec.

The coast is broken, with long fiord-like inlets, and a submerged range gives rise to a chain of islands, the largest of which is Vancouver Island, 300 miles in length. The magnificent scenery of mountain and coast attracts many tourists and there are a number of fine national parks.

Climate

The prevailing south-west winds and the warm Pacific Drift keep the coastal districts of British Columbia warm and free from ice. The annual rainfall in many places is over 60 in., falling mainly in autumn and winter, and the western slopes of the coast ranges are clothed with coniferous forest of spruce, pine, fir, and red cedar. The interior valleys, such as the Kootenay, are much drier, often with a rainfall of little more than ten or twelve inches; the summers are warmer and winters colder than near the coast. Fortunately the higher mountain slopes receive more rain and a good deal of snow, so that water is available from the mountain streams for irrigation purposes.

Occupations

The chief occupations of British Columbia result from the development of its natural resources. Fishing, lumbering, fruit growing, and mining are all important.

FISHING.—The salmon fisheries of British Columbia are of great importance. In July and August four-year-old salmon enter the swift rivers from the sea, leaping falls and struggling against the strong currents, until eventually they reach the quiet sandy pool where they were hatched. They arrive in poor condition, discoloured and exhausted, and after spawning often die. Their eggs lie on the bottom of the pool covered with fine sand or gravel until they hatch. The young fish, or fry, after some weeks or months make their way to the sea. Special salmon hatcheries have been developed in many places, where the eggs are carefully protected and young fish cared for until they are ready for their journey. These hatcheries are intended to safeguard future supplies of salmon. It is during the spawning season when the shoals come in from the sea that the salmon are caught in nets in the river estuaries (*see* plate facing p. 65). Vast quantities, usually of the "sockeye" variety, are canned and others are distributed fresh, frozen, or smoked. The fish to be canned are fed into a machine in which the head, fins, and tail are removed and the fish is slit open and cleaned. It is then cut into slices and fitted into tins which are sealed and steam heated under pressure. Much of the work is done by Indian girls and Chinese boys. Nothing is wasted. Special grades of oil rich in vitamin D are extracted from the liver; other inferior grades of oil are used for making soap and paint. Meal for feeding poultry and stock is prepared from the offal, and the "waste" is converted into fertiliser.

Most salmon are caught in the estuaries of the Fraser and Skeena rivers. New Westminster and Prince Rupert are canning centres.

The sea fisheries of the Pacific coast yield halibut, cod, and herring. American and Canadian fishermen share the halibut fishing grounds off British Columbia and Alaska by agreement. The catches are usually landed at Prince Rupert or Vancouver.

LUMBERING.—Nearly three-quarters of British Columbia is covered with forest so it is not surprising to find that saw-milling and the manufacture of pulp and paper are the most important industries. In the mild wet climate of the coastal regions trees such as the Sitka spruce, red cedar, and Douglas fir grow to a great height. The latter often reaches over 200 ft and provides durable timber for ships' masts, flagpoles, and heavy buildings. Some of the

finest stands of Douglas fir are in Vancouver Island. The mountainous character of the forested country makes the transport of timber difficult and expensive. Most of the lumbering is done near the coast, and as the rivers are usually too swift for floating the timber, much of it is hauled by train or tractor to the saw mills. The logs are sometimes floated singly down artificial wooden channels, known as "flumes". British Columbia produces two-thirds of Canada's timber, has many pulp mills, and a number of factories making veneers and plywood.

FARMING.—In the southern part of the province fruit farming is important. Apples are extensively grown and the dry sheltered valleys of the interior, such as the Kootenay and Okanagan, have irrigated orchards of plums, pears, peaches, and apricots. Some of the fruit is canned for export. Elsewhere mixed farming is predominant, and on Vancouver Island and in the Lower Fraser valley, where the rainfall is heavier, there is much dairying, poultry farming, and market-gardening (or "truck-farming" as the Canadians call it). Grain is grown in favoured districts, especially in the Peace River district of the north-east. There are many cattle ranches on the dry inland plateaux.

MINING.—The ranges of the Western Cordilleras are rich in minerals. Gold was found in the Fraser valley in 1858, and later in the Caribou mountains, and it has since been mined in many other localities. The discovery played an important part in the decision to build a railway through the mountains linking British Columbia with the Prairies and eastern Canada. The gold occurs either in veins of solid quartz rock or in river gravels formed from the material worn away from these rocks. Explosives are usually used to blast out the quartz veins and the rock is then crushed, washed, and chemically treated to extract the gold. This is known as "lode" mining. Gravels in which minerals are found are known as "placer" deposits and the minerals are obtained by "placer" mining. In the early days individual prospectors washed the gravels in open pans, rather like frying pans, but to-day great dredges excavate the gravels and they are washed by special hydraulic machinery.

Other minerals include copper, the ores of which are refined at *Trail* (12,000), near the United States border, the famous lead-zinc ores of the Sullivan mine at Kimberley, and silver and mercury.

On Texada Island which lies between Vancouver Island and the mainland there are large open iron mines. The ore is concentrated on the spot and considerable quantities are shipped to Japan.

Coal is mined at Fernie, near the western end of the Crow's Nest Pass, and at Nanaimo on the eastern side of Vancouver Island. Small quantities are also found in the Queen Charlotte Islands, and there is some anthracite in the Kootenay valley. Most of the coal used for railways and shipping is obtained within the province, though a little is brought in from Alberta, but power is increasingly obtained from hydro-electric sources. The Peace River, for example, in the central interior of British Columbia, is being harnessed to provide 4 million horsepower.

THE ALUMINIUM INDUSTRY.—On the British Columbian plateau, the Nechako River, a tributary of the Fraser River, has been dammed to form a reservoir over 100 miles long and the water has been diverted to supply the largest electric power station in the world at Kemano (*see* Fig. 27). Cheap electric power is carried by cable to Kitimat on the Douglas Channel, a deep inlet about 50 miles south of the Skeena estuary and some 400 miles north of Vancouver. Here it is used to smelt aluminium from bauxite imported from Jamaica via Panama (*see* plate facing p. 65).

Towns

The population of British Columbia is 2,010,000. At least two-thirds of the people live and work in the few large towns and cities. Power for domestic and industrial use is provided by hydro-electric plants on the Columbia River before it reaches the U.S.A.

Vancouver (950,000), situated on Burrard Inlet near the mouth of the Fraser River, is the largest city of British Columbia and third city of Canada (*see* plate facing p. 64). It has a fine ice-free harbour sheltered from the prevailing south-westerly winds by Vancouver Island. As the western terminus of the Canadian Pacific Railway, it forms the chief outlet of Canada on the Pacific coast, exporting wheat, lumber, wood-pulp, copper, lead, zinc, and canned fish. It is particularly important as a wheat port in the winter months when the St Lawrence ports are frozen, and probably deals with more wheat than any other port in the world. Coastal steamship services connect through the Alaskan port of Skagway, with the rail to the Yukon goldfields, and steamship lines fan out across the Pacific to

China, Japan, Australia, New Zealand, and Panama. There are sawmilling, engineering, metal smelting, and shipbuilding industries.

Victoria (173,000), situated at the southern end of Vancouver Island, is the capital of British Columbia and has a milder climate than any other city in Canada. It is connected by rail with the Nanaimo coalfield and with fruit growing and lumbering areas. Victoria serves ocean shipping and is used as a whaling station and by the seal fishing fleets which operate in the Pribilof Islands. It is the main Pacific base for the Canadian navy. Electricity is supplied to Vancouver Island by under-water cable from a hydro-electric plant on the mainland.

Nanaimo (15,000) is the nearest port on Vancouver Island to the mainland. It is an important distribution centre and has pulp mills.

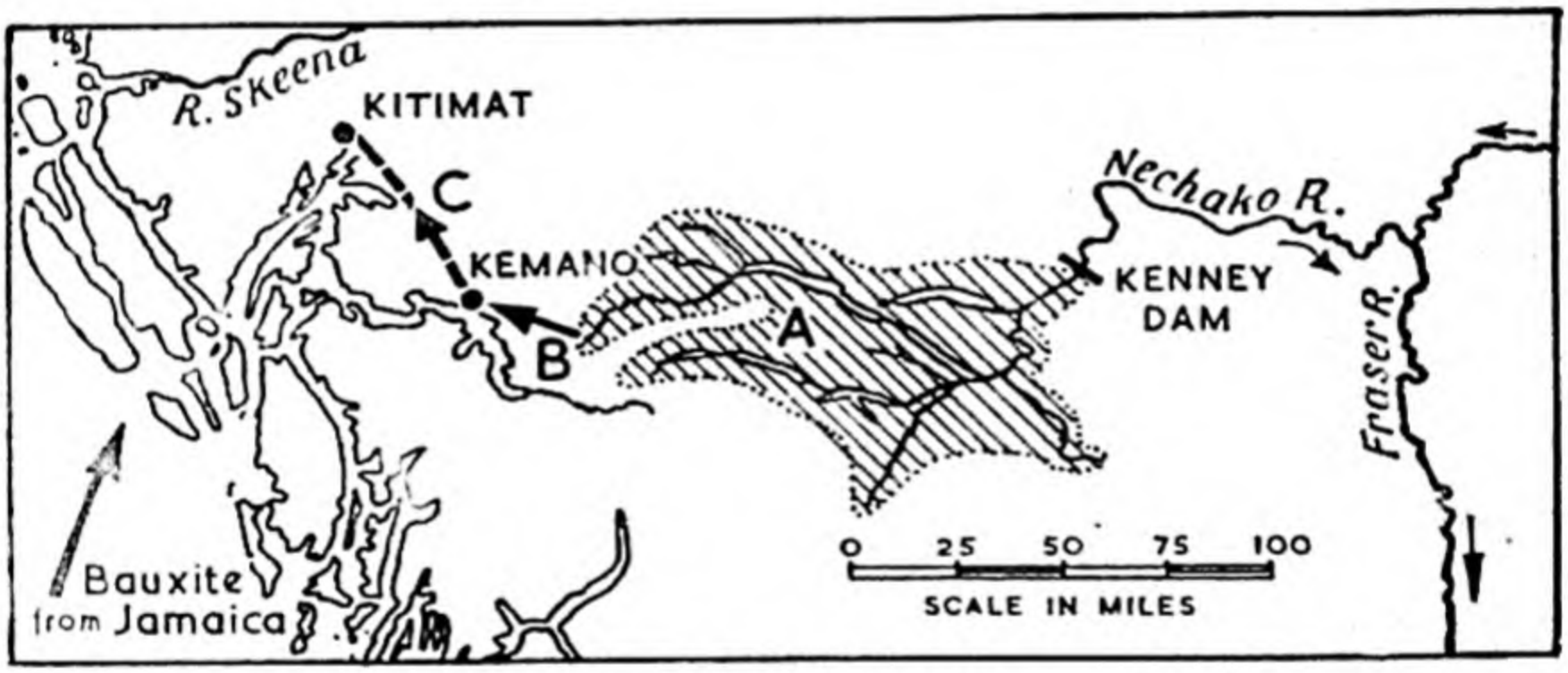


Fig. 27. THE KITIMAT ALUMINIUM PLANT.

A. Reservoir of water held back by the Kenney Dam.
B. Pipeline tunnelling through mountains to carry water to the electric power station at Kemano.
C. Cable carrying electricity to the smelter at Kitimat.

New Westminster (37,000), on the northern side of the Fraser estuary, is a salmon canning centre and has shipbuilding yards.

Prince Rupert (15,000), on the Skeena River, is also a salmon canning centre. It is the Pacific terminus of the Canadian National Railway.

THE YUKON

The Yukon Territory lies in the north of the Western Cordilleras. It is an elevated plateau with many high mountains including

Mount Logan (19,850 ft), Canada's highest peak. The Rivers Pelly and Lewes unite to form the River Yukon which flows through Alaska to the sea.

The Yukon was first explored by fur traders. In 1896 gold was discovered in placer deposits in the Klondyke area and there was a rush of prospectors. By 1898, Dawson City had become a mining centre with 25,000 people. Since then the goldfields have declined in importance. In 1901 the population of the Yukon was 27,000; it is now only 15,000, including 2,170 Indians. In winter, when the ground is frozen, it is difficult to carry on mining operations and many miners leave the Yukon. To-day, the production of silver takes first place, followed by lead, gold, and zinc. Zinc mined near Whitehorse is exported to Japan. To the north of Dawson, a new oilfield has been discovered and it is possible that the town may regain something of its former importance.

Some farming is carried on in the summers which are warm enough to grow useful crops of wheat and vegetables.

Whitehorse (5,000), the seat of government of the Yukon, was so-named from the "white-horses" seen on the River Yukon as its water foams over the rocks in the rapids. It has been important as a distribution centre for the Yukon since the narrow gauge railway was built to connect it with the Alaskan port of Skagway in 1910. It is connected with the Prairie Provinces by the Alaska Highway (*see* Figs. 23, 45, and 46).

CHAPTER X

CANADA: COMMUNICATIONS AND TRADE

Introductory

The development of natural resources in a vast country like Canada depends on a good transport system. The great inland waterway of the Great Lakes and St Lawrence (*see* Chapter VI) has been a great aid to development in eastern Canada, though its usefulness is unfortunately reduced by the fact that it is ice-bound in winter. The lakes are used to carry wheat to the St Lawrence ports for export to Europe and to bring coal and iron to the industrial centres, many of which have grown up on or near the lake shores. Western Canada, and the Prairies, however, depend almost entirely on railways to carry the products of farm and mine to the Great Lakes or to the coast for export.

Road and air transport is of great importance in Canada, especially in the areas which are not served by rail.

Railways

Canada has two great railway systems, the Government owned Canadian National Railway and the privately owned Canadian Pacific Railway. Both systems have important trans-continental lines.

(*a*) THE CANADIAN PACIFIC RAILWAY.—This trans-continental line starts at St John in New Brunswick, strikes west through the New England State of Maine, and crosses the St Lawrence by bridge at Montreal. It then passes through Ottawa, the Dominion capital, and the lumbering districts of the Ottawa valley, runs westwards through the nickel mining town of Sudbury, and reaches the shores of Lake Superior at Port Arthur and Fort William, both important wheat ports. Crossing the Red River at Winnipeg it enters the Prairies and continues westward through Regina and the ranching centre of Calgary to Banff. It runs through a tunnel under the Kicking Horse Pass into the Columbia valley, finally crossing the Selkirk Range and descending by the Fraser valley to the Pacific coast at Vancouver. The journey of 2,900 miles from Montreal to

Vancouver takes about three days. Many important branch lines link up with this main C.P.R. route, one crossing the Rockies by the Crow's Nest Pass, linking the prairie town of Medicine Hat with the copper mining areas around Rossland and Trail.

(*b*) THE CANADIAN NATIONAL RAILWAY.—This runs from Halifax in Nova Scotia to Quebec, where it crosses the St Lawrence by a high bridge. It continues along the St Lawrence valley to Montreal, and following the Ottawa valley it passes across the Shield country north of the Great Lakes, serving the farmlands of the Cochrane clay belt. Reaching Winnipeg, it passes westward through the prairie towns of Saskatoon and Edmonton, and crosses the Rockies by the Yellowhead Pass, following the upper Fraser and the Skeena valleys to Prince Rupert (*see* frontispiece). The gradients are not so steep on this route as on the C.P.R.

An important branch line by way of the Nelson River valley to Churchill on Hudson Bay provides a link with the most direct sea route to Britain. This is used in early autumn for the export of wheat from the Prairies, but Churchill is closed by ice in winter.

Three important lines diverge from Edmonton. One runs to McMurray on the Athabasca, another serves the settlements of the Peace River district, and a third crosses the Rockies to Vancouver. The C.N.R. route from Montreal to Vancouver via Ottawa, Winnipeg, and Edmonton is the fastest trans-continental route, taking less than seventy hours. The train is drawn by a diesel-locomotive and is so well equipped with dining cars and sleeping quarters that it has been called an "hotel on wheels".

In crossing a country the size of Canada by one of the trans-continental routes the problem of time becomes obvious. In Britain all clocks take their time from Greenwich and difficulties do not arise. In Canada, when it is noon by the sun on the Atlantic coastline, it is not yet 8 a.m. on the Pacific coast. So Canada is divided into a number of "time zones", and within each zone one standard time is kept. A traveller passing from one zone to another has to alter his watch by one hour, putting it back if travelling from east to west and advancing it if travelling from west to east (*see* Fig. 28).

Railway transport in Canada is so important that expansion of the systems continues and the construction of many miles of new track is planned, especially for the northern areas.

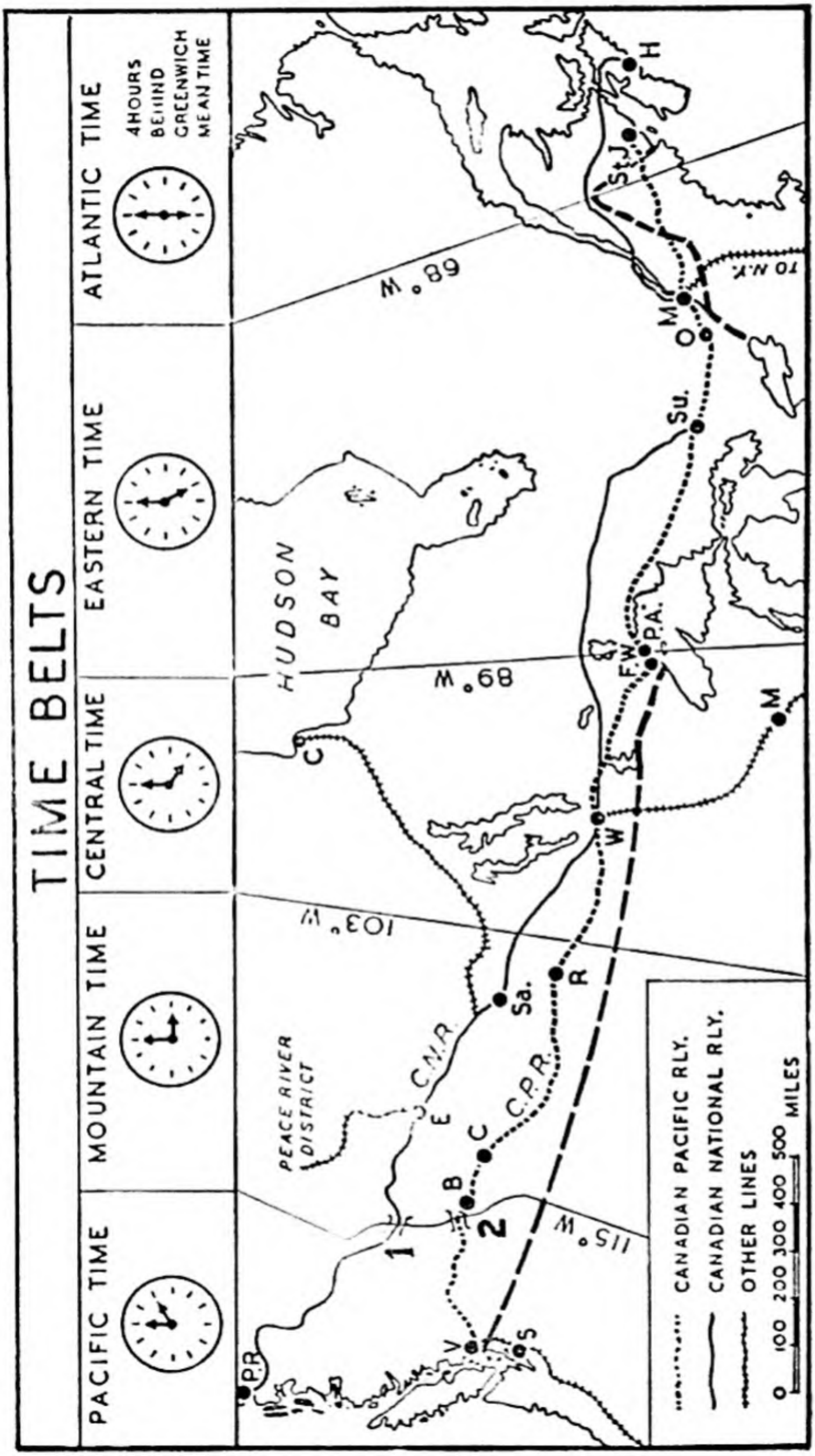


Fig. 28. The Trans-Continental Railways of Canada.
1. Yellowhead Pass.
2. Kicking Horse Pass.

Roads

There are good paved roads in all the densely peopled areas of Canada and new highways are being extended into the developing areas further north under a government-sponsored "Roads to Resources" programme.

The most important road is the 5,000 mile long Trans-Canada Highway which links the Atlantic port of St John's in Newfoundland with the Pacific port of Victoria in British Columbia, with car ferries to bridge the sea crossings. The Highway links Montreal, Ottawa, Winnipeg, Regina, Calgary, and Vancouver, crossing the Rocky Mountains by Roger's Pass. The building of the road was a remarkable engineering feat. Millions of tons of rock were used to fill in muskeg swamps to the north of Lake Superior. Two miles of paved road disappeared overnight into the swamps in one section before a solid track could finally be laid. West of Winnipeg, the Assiniboine River had to be diverted into specially constructed channels while high bridges were built capable of withstanding the floods which sometimes cover many square miles in the spring thaw. For some 80 miles in the Rocky Mountains steel and concrete canopies have been constructed to protect the road from avalanches. The road provides a valuable link between the main centres of population and is much used by tourists from the U.S.A.

Air Transport

Air transport is used extensively in Canada for both passengers and freight. *Trans-Canada Air Lines*, a government corporation, operates internal and overseas services, as does *Canadian Pacific Air Lines*. Regular daily air routes link the main towns and cities and, from these, feeder services, which are often run by independent air-lines, serve remote areas and deliver mail. Furs, fish, and mineral ores are brought from the north; and mining equipment, newspapers, food, and medical supplies are flown to outlying settlements.

The most important daily service links St John's in Newfoundland with Vancouver on the Pacific coast via Sydney, Halifax, St John, Montreal, Toronto, Winnipeg, and Calgary. Regular daily feeder services include: (*a*) St John—Boston, (*b*) Toronto—London—Windsor—Detroit—Chicago, (*c*) Winnipeg—Regina—Saskatoon—Edmonton. Other lines link Winnipeg with Churchill, Sherridon, and Flin Flon; Edmonton with McMurray, Yellowknife, Coppermine, Fort Nelson, and Inuvik.

Trans-Canada Air Lines operates routes to the U.S.A., the British Isles, Bermuda, and the West Indies; and *Canadian Pacific Air Lines* operates services to Australia, New Zealand, and the Far East. *Canadian Pacific Air Lines* also provides a non-stop service from Vancouver to Amsterdam taking a short Arctic route.

Trade

The leading Canadian exports in 1967 were valued as follows:

Motor vehicles and parts	1,606	million dollars
Wood-pulp and paper	1,590	„ „
Wheat and wheat flour	760	„ „
Wood and plywood	632	„ „
Copper ore and concentrates ...	438	„ „
Aluminium	399	„ „
Petroleum	398	„ „
Iron ore and concentrates	383	„ „
Aircraft and parts	313	„ „
Farm machinery	183	„ „
Asbestos	145	„ „
Whisky	141	„ „
Natural gas (to the U.S.A.) ...	124	„ „

Other exports include cattle, zinc, and fertilisers.

The exports of Canadian paper and motor vehicles go mainly to the U.S.A. The chief customers for Canadian wheat are Britain, Russia, Japan, and China.

The chief Canadian imports in 1967 were:

Motor cars and parts	1,411	million dollars
Machinery for industry	890	„ „
Farm machinery and tractors ...	402	„ „
Aircraft and parts	361	„ „
Crude petroleum	356	„ „
Steel	244	„ „
Fruit, fresh and canned	200	„ „
Woven fabrics	196	„ „
Coal	142	„ „
Electronic computers	116	„ „

Books	...	...	...	...	96	million dollars
Coffee	...	...	...	...	78	„ „
Raw cotton	...	...	...	...	64	„ „

Other imports include glass and sugar. The motor car and aircraft parts are mainly brought in from the U.S.A. and assembled in Canadian factories.

The bonds of trade between Canada and the U.S.A. are very close. More than half of Canada's exports go to the U.S.A. and nearly two-thirds of her imports come from the U.S.A. Britain ranks second in trade with Canada. Of particular interest among Canada's minor exports are natural gas (by pipeline) and electrical energy (by cable) which go to the U.S.A.

CHAPTER XI

THE U.S.A.: GENERAL

Introductory

The United States, with an area of over 3 million square miles, is about twenty-five times the size of the British Isles and only a little smaller than Europe. It is made up of fifty states and a small area of Federal territory known as the District of Columbia, in which Washington, the seat of government, is situated. The original number of states in 1776, at the time of the Declaration of Independence, was thirteen. The remaining thirty-seven have been added at various times and in various ways: Alaska was admitted as late as 1959 and Hawaii in 1960. The U.S.A. also administers the Panama Canal Zone, and strategic bases in the Pacific Ocean and in the West Indies. The vast extent of the country may be realised from the fact that the air-line from New York to San Francisco (2,565 miles) is only just over 600 miles less than the air-line from New York to Belfast (3,175 miles), while the air-line from New York to Miami (Florida) is 1,095 miles. There is a difference of five hours between the standard time of New York and London and of three hours between New York and San Francisco.

The U.S.A. has a population of over 200 million people. This indicates a remarkably rapid growth since, at the time of the Declaration of Independence in 1776, the population was only 3 million.

The American People

One of the most striking facts about the United States is that the American people have resulted from the mixing of many races. Yet whatever their origin, they all call and feel themselves Americans. The native Indian tribes who lived in North America before the Europeans began to settle there are described on pp. 2-3. The settlers in what is now known as the United States of America were of two main types and mainly British. They had very different outlooks on life. One group populated the northern states, roughly

north of latitude 36° 31′ N., the other group spread across the area south of that line—the southern states.

British settlement at first kept to the east coast, since the Appalachians formed an effective barrier to easy expansion inland.

The earliest settlers in the northern states were the Pilgrim Fathers, who, seeking to escape from religious oppression in Britain, landed near Cape Cod in 1620 and formed a colony near Plymouth (Massachusetts). They were determined people, prepared to endure hardship, and anxious to turn their back on Europe and start life afresh in a new world. They did not despise hard manual work, and took an austere view of life very much like that held by the Roundheads in England in Cromwell's time. They valued education highly and in 1636 Harvard University came into being, followed by Yale in 1701. The influence of these early settlers on the subsequent development of the New England States is discussed later (*see* p. 89). Other emigrants of similar type followed. One of these was the Quaker, William Penn, who founded Philadelphia in 1682, and originated the colony of Pennsylvania where many oppressed people sought freedom. At a much later date, there was a big influx of Irish who emigrated because of the Irish potato famine of 1846, and of Germans fleeing from oppression in Europe in 1848. All these people had braved hardships in the cause of freedom and did not disdain hard work. Undoubtedly their dogged outlook became one of the outstanding characteristics of the northerner who inhabited the northern states. In later years many Europeans of various nationalities settled in the northern and middle west area. These are referred to on pp. 83-4.

A very different type of early colonist entered the South Atlantic States and subsequently spread inland to the Mississippi. As early as 1584 Raleigh had attempted to colonise the east coast in the area which he named Virginia. Many more colonists followed in the reign of James I; they were largely derived from the British aristocracy and were chiefly interested in raising plantation crops of tobacco and cotton. Their outlook on life was very different from that of the more austere northerner. They were a cultured people who were themselves educated but who did not consider education necessary for the lower classes. They were unused to manual work which they regarded beneath their dignity. Indeed, the warmer climate of the southern states made manual labour physically difficult for them. Many of them built mansions and

acquired large estates where they tried to carry on the traditions of leisure and sport of their British aristocratic ancestors. Labour was needed for the plantation and the problem caused by the mode of life of the southern colonists was solved by the introduction of negro slaves. In 1619 a Dutch ship brought the first cargo of twenty negro slaves to Jamestown, Virginia. The slave trade became extremely profitable and many European nations, as well as some of the northern states of America, took part in it, and by 1800 there were about 70,000 negroes in North America. Slavery was accepted as a fact by the American Constitution of 1788 and slaves were to be found in both northern and southern states, although by far the greater number lived on the big estates of the south, where the climate was warm and labour was needed. Many of them were happy and were both respected and loved by the families they served. In other cases their lot was hard.

The southerners always looked back to England with affection. Unlike the northerners, they had not emigrated because of oppression and so they had no desire to sever connection with the mother country with whom their relations have always been good.

French-British War

Expansion westward through the Appalachian gaps brought the British into conflict with the French traders of the interior. War broke out between the two countries and resulted in defeat for the French in 1763. As a result Britain came into possession of all the land east of the Mississippi with the exception of Florida, which belonged to Spain. The British territory comprised thirteen states which are represented by the thirteen stripes on the American flag. Unfortunately the early colonial days were marred by bad administration by the British Government, and in 1774 the colonists at the first Congress at Philadelphia drew up a list of grievances.

American War of Independence

In 1775 war broke out between Britain and the American colonists. George Washington was commander-in-chief of the rebel forces and later became the first President of the U.S.A. The British forces were defeated, and although a Declaration of Independence had been issued by the Congress in 1776, it was not until 1783 that American independence was recognised by Britain. In 1788 the

Above: The port of New York. In the foreground Brooklyn, separated from Manhattan Island by the East River. In the background the Hudson River and the City of New Jersey. *(United States Information Service.)*

Below: There are more motor vehicles in the United States than in the rest of the world put together. Hence, despite the vast area, there are serious traffic problems near large cities. The picture shows the fly-over junction of two arterial roads near New York. *(United States Information Service.)*

Above: Miami, Florida, one of the most popular resorts of the Southern United States. The "islands" in the foreground are man-made. (*United States Information Service.*)

Below: The Everglades, Florida. (*United States Information Service*).

Constitution of the United States came into being as a basis for the government of the new country.

United States Government

The Government of the United States consists of three main sections:

(1) The Congress is the legislative part of the government responsible for making laws. There are two houses of Congress:

(*a*) The House of Representatives. Each state elects a number of representatives in proportion to the size of its population. Each representative is elected for two years.

(*b*) The Senate. Each state (irrespective of its size) sends two members to the Senate. Each Senator is elected for six years.

(2) The President, who holds office for four years, is the executive head of the Government.

(3) The Supreme Court decides if laws made by Congress are in agreement with the Constitution.

The American Civil War—1861-5

It has been pointed out that the outlook of the people of the northern states was very different from that of the southerners. The rapid growth of population and the industrialisation of the north increased the difference between them. The south feared that her interests would be swamped by the growing north and some of the southern states contemplated breaking away from the Union. The right of a state to secede from the Union was allowed by the Constitution. One of the big issues at stake between north and south was the question of slavery. According to the written Constitution slavery was legal, but several of the northern states had already declared it illegal within their boundaries. The southern states were against the abolition of slavery. Attempts were made to divide the number of states in the Union into an equal number of "non-slave" or free states and "slave" states, and it was vainly hoped some compromise could be made by which the southern states would renounce their claim to secede from the Union. The causes which led up to the Civil War are complicated and the student should refer to a good history of the U.S.A. for a full account. It is sufficient here to indicate that deep-rooted differences

of opinion led to the outbreak of hostilities in 1861. The northerners, who were known as Republicans (many of whom had themselves sought freedom from oppression by emigration to America and to whom the problem of plantation labour was of little concern), strongly advocated the abolition of slavery. The southerners, who were known as Democrats, gave many reasons for thinking that the negroes were happier as slaves and that a gradual emancipation would be better for them. The Civil War ended in victory for the northern states, and the Constitution was amended in 1865 to make slavery illegal. A later amendment provided that the right to vote should not be denied to any citizen of the U.S.A. on account of race or colour, thereby conferring political equality on the negro.

Present Position of Negroes in the United States

Despite the fact that racial discrimination is illegal in the U.S.A., many whites in the southern states still regard the negroes as inferior and there is much social discrimination against them. Educational opportunities are not so good for the negro in the south, although there are some good negro colleges such as the Normal and Industrial Institute founded by the famous negro educationalist, Booker Washington. In 1954 the American Supreme Court ruled that racial segregation in schools supported by taxation was unconstitutional. As a result negroes have been admitted to many schools formerly exclusively reserved for whites, but there is still some resistance to this change in the south, especially in Alabama and Mississippi. There has been particularly fierce opposition to the entry of negro students to some "white" universities and colleges, which has resulted in violence. In such areas negroes are often debarred from mixing with white people in hotels, restaurants, and other public places. In many cases a negro may enter a profession but is not allowed to serve the white community. He is thus debarred from many official posts. The Supreme Court firmly upholds the Constitution and condemns discrimination against the negro but there is still bitter opposition in some of the southern states. At one time some of the less educated negroes were content with this situation but to-day the negro people of America increasingly resent being treated as inferiors.

Several million negroes have moved in recent years to the industrial areas of the north and to the western states where public

opinion is not so openly antagonistic and where there are wider opportunities; others remain to fight against segregation in their own state. More than one-third of America's 20 million negroes now live in the north and the proportion is increasing. But even here the colour bar is felt. In the cities, most of the negroes are to be found crowded together in districts such as Harlem in New York and certain parts of Chicago, Detroit, and Philadelphia. There are insufficient houses to provide adequately for the large numbers of negroes who have come to work in the northern industries, and in many negro quarters housing conditions are bad. If negroes obtain a house in a district occupied by white people, the white population tends to move out and the value of property decreases. Thus, negroes find it difficult to secure better conditions. In industry many trade unions refuse to admit coloured people, and should a negro rise to a position of responsibility over white workers the promotion is frequently resented by the whites and unrest and strikes result.

The colour problem in America is far from solved and will require the co-operation of educated whites and negroes to work out a solution which will bridge the gap between the two races. That negroes are capable of occupying important positions is shown by the negro lawyers, doctors, and newspaper men who serve their own people, and by distinguished men who have achieved fame outside their own circle.

Westward Expansion

The latter part of the nineteenth century was marked by westward expansion. Attracted by gold and virgin soil, settlers pushed the frontier ever more to the west. Railways played a big part, and by 1890 several lines crossed the continent and American settlement reached the Pacific.

Immigration

The vast territory thus opened up was underpopulated. Some 44 million immigrants entered the United States between 1820 and 1967. British, Germans, and Scandinavians formed the great part of the immigrants in the nineteenth century. These people were of good stock and were readily assimilated. There are large prosperous communities of Germans and Scandinavians in the Middle West at the present time. In the twentieth century the type of

immigrant changed. During the first ten years of the century the annual numbers of immigrants reached their highest figure and were largely made up of people from southern and central Europe, such as Italians, Poles, and Hungarians. The U.S. Government, concerned because so many of them were illiterate and unskilled workers, passed the first Quota Act (1912) which limited the number of immigrants from any one nation who might enter the country. Quota regulations still restrict immigration into the United States but since the Immigration Act of 1965 the numbers of immigrants have increased again. Nearly half a million enter every year. To-day most immigrants come from Mexico, Canada, Germany, the United Kingdom, and Eire.

Japanese and Chinese settled mainly in the Pacific States, especially in California where there was practically no negro labour. Most of the Japanese entered the country between 1900 and 1920. They did not mix readily with the whites and tended to segregate into oriental communities. They were prepared to work for lower wages than the whites, particularly on the fruit and vegetable farms. For this reason, and because their ways of life were so different, there grew up a strong anti-oriental prejudice which led to severe restrictions on all Chinese and Japanese immigration. To-day, relatively few immigrants from either China or Japan are admitted to the U.S.A.

The American people have thus been derived from many nations, but the various races have become welded together into a single American nation. A man may boast of a pure Swedish descent, but he considers himself not a Swede but an American citizen.

Natural Resources

Within the vast area of the U.S.A. there is a great variety of scenery and climate and rich natural resources. There are immense reserves of coal, iron, oil, and many other minerals, and the output of agricultural products from its soil—wheat, maize, cotton, tobacco, dairy produce, and fruit—is very large. Its industrial undertakings are on a vast scale.

Land Use.—The early settlers were first attracted to the fertile lowlands where successful growing of crops was limited to areas of adequate rainfall. During the present century agriculture has been extended to the drier areas by the construction of large irrigation works and by the practice of dry farming (p. 129). Active interest

is now concentrated on using to the full the water resources of the country and lands made derelict by soil erosion are being reclaimed. Soil conservation by contour ploughing has reduced the soil wash on slopes and careful selection of crops in areas with erratic rainfall has helped to cover surfaces which, if left bare, might suffer from wind erosion.

The United States stretches through 24 degrees of latitude so that it is possible to grow a variety of crops, temperate and subtropical. On the other hand there are no vast stretches of forested land, as in Canada. In the eastern states many trees were felled to provide open farmland for the settlers. The chief stands of natural forest are now mainly limited to the wetter middle slopes of the Pacific coast mountains and the Appalachians. Oregon and Washington are the most important states for constructional timber. New England, which once supplied large quantities of sawn timber, now produces only 2½ per cent. of the United States total; woodpulp is more important, especially in Maine.

MINERALS.—The United States is richly endowed with mineral wealth. The most important are coal, petroleum, and iron ore, but there are also large reserves of all the common non-ferrous minerals with the exception of tin.

The principal coalfields occur in three main areas:

(i) The Appalachian Coalfield; (ii) the Central or Eastern Interior Coalfield; (iii) the Western Interior Coalfield. Coal is also mined in small quantities in Utah. In general the quality of the coal deteriorates from east to west.

The Appalachian Coalfields of Pennsylvania, West Virginia, eastern Kentucky, and Alabama have the greatest reserves and highest production. The quality of the coal is high and it occurs in almost horizontal seams which are easy to work. Most of it is good bituminous coal suitable for coking and for industrial use. Anthracite is mined in the extreme north-east of the coalfield.

The Central Coalfields extend over much of Illinois and parts of Indiana and western Kentucky. Although the seams are thick and easily worked, the coal is not suitable for coking and usually needs treatment before it is marketed.

The Western Interior Coalfields have poor quality coal and mining, on a relatively small scale, is carried on in Montana,

Wyoming, Colorado, and New Mexico, mainly for local needs. Lignite, or brown coal, which is low in carbon content occurs over wide areas, especially in Montana, North Dakota, Wyoming, and Texas, but it is little used.

Petroleum was produced in Pennsylvania as early as 1860 but the development of the oil and natural gas industries belongs mainly to the twentieth century. The Pennsylvania oilfield is now nearly exhausted though it still produces natural gas. The principal oilfield—the mid-Continental field—lies east of the Rocky Mountains and stretches through Kansas, Arkansas, Oklahoma, Texas, and Louisiana. The most productive area lies in Texas, Louisiana, and Oklahoma and extends into the coastal waters of the Gulf of Mexico. Texas alone produces more than one-third of United States oil. There is also an important oilfield in the south of California.

Natural gas is frequently associated with oil. At one time it was regarded as useless and was burnt. It is now collected and distributed through a network of pipelines to many parts of the country for domestic and industrial use. Most of the natural gas comes from the south-west. Measured in terms of heating power, the natural gas production of the United States is equivalent to about 500 million tons of coal a year.

The rivers of the United States form another important source of power and many have been harnessed to provide electricity. Some of the most spectacular undertakings are in the Tennessee valley, on the Columbia River, and on the Colorado River. However, only about one-third of the electrical power generated in the U.S.A. is hydro-electricity; the rest is produced from thermal stations using coal or oil. The U.S.A. imports electricity from Canadian generating stations in the St Lawrence Valley which are conveniently near the industrial areas of the north-east.

The U.S.A. has good supplies of iron ore. By far the largest deposit is of high grade haematite which is found near the shores of Lake Superior in Michigan, Wisconsin, and Minnesota. The ore is dug from open workings by giant excavators, and the Great Lakes are used to carry the ore to the steel furnaces at Cleveland and Pittsburgh. Unfortunately, most of the best ore has already been used; attempts are now being made to concentrate the lower-grade ores. Iron ore also occurs near Birmingham on the Alabama coalfield and in Utah.

The ores of non-ferrous metals are found mainly in the western mountains and in the Ozarks. Copper is the most important: it is mainly mined in Montana, Arizona, and Utah. Zinc and lead which often occur in the same mineral veins are produced in Montana, Idaho, and the Ozarks. Gold is found in many parts of the Rocky Mountains, including South Dakota, but there is no large scale production.

The largest known deposits of sulphur in the world occur on the Louisiana and Texas oilfields and salt is also obtained from Louisiana. Minerals which are used as fertilisers on American farms include phosphate rock from Florida, and potash deposits in New Mexico, Utah, and California.

CHAPTER XII

THE ATLANTIC STATES

The Atlantic coastal region of the U.S.A. may be divided into four parts:—

I. The New England States.
II. The Central Atlantic States.
III. The Southern Atlantic States (excluding Florida).
IV. Florida.

I. THE NEW ENGLAND STATES

The New England States extend from New Brunswick and Quebec in Canada to New York. To the south and east they reach the sea, but on the west they are joined to the rest of the U.S.A. along the border of New York State.

Relief and Climate

These states, which occupy the northern part of the Appalachian system, have surface features similar to those of the Canadian Atlantic Provinces. The region is composed of old hard rocks, which form hilly country deeply cut by rivers such as the Connecticut and Merrimac which run from north to south, leaving high ridges between their valleys. The land has sunk so that the sea has entered the lower parts of the valleys, leaving very little low land near the coast.

During the Ice Age glaciers moved over the country, breaking off boulders from the rocky surface. When the ice retreated much of the higher land was bared of soil and the lower land was strewn with stony clay and sandy gravel. In a few places the glacial clay is fertile, but in many areas the stony nature of the soil renders agriculture difficult.

New England has no dry season. The summers are warm but the winters are cold, with snow lying on the ground for four or five months. Thus the growing season is shorter than that of the more southerly Atlantic States.

Development

The area was originally forested with conifers and deciduous trees, such as spruce, pine, hemlock, oak, and maple. It was not an inviting land which was first settled by the Pilgrim Fathers, those hardy immigrants who left Britain in the *Mayflower* and settled at Plymouth and Cape Cod Bay in the early seventeenth century. The only natural wealth was the forests of the interior and the fish in the shallow waters off the coast. The need for fishing vessels and the abundance of timber gave rise to a shipbuilding industry, and New England ships soon began to trade with the West Indies and the South Atlantic States and to take part in the transport of negro slaves from Africa to the south of the U.S.A. The returning ships brought sugar, cotton, and rubber, raw materials which formed the basis for New England's manufacturing industries, which were to develop so amazingly in later years.

FISHING.—Good natural harbours led to early development of the fishing industry. Boston, Gloucester, New Bedford, and Portland are the chief fishing ports. Mackerel, herring, and lobsters are caught near the coast, and cod is fished from the Newfoundland Banks.

LUMBERING.—Many of the original forests are gone, but lumbering is still important in the Merrimac and Upper Connecticut valleys, providing timber for the saw and paper mills of Holyoke (Mass.) and Maine. Sugar from maple sap is obtained in Vermont and New Hampshire.

FARMING.—Farming was at first carried on in the areas cleared of timber, in order to provide necessities of life such as wheat, meat, leather, flax, and wool. Depending on their own efforts, the early settlers spun wool and flax, made cloth, tanned hides and made their own boots, and thus established one of the most important industrial areas in the U.S.A.

The extreme difficulties of soil and climate and the possibility of obtaining farm products elsewhere in North America later caused many farms to be abandoned. To-day the farming practised is of the specialised and intensive type such as the production of dairy produce, fruit, and vegetables, for sale in the industrial areas. Maine produces good seed potatoes which are in demand in other parts of the U.S.A. There has also been a successful experiment in

growing tobacco in the Connecticut valley. Great care is taken to protect the crop from insect pests and adverse weather, and the result is excellent tobacco which can command a higher price than

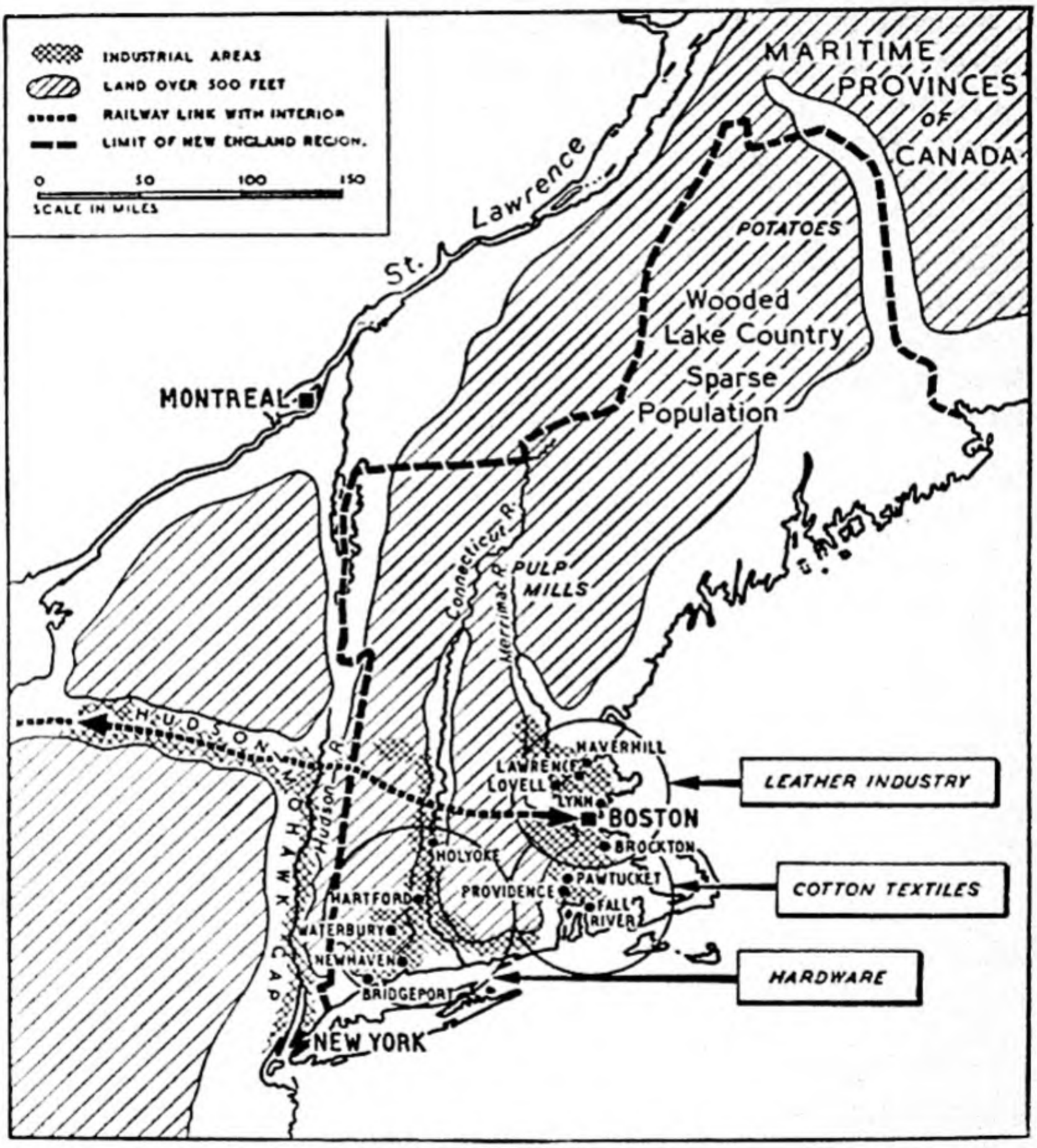


Fig. 29. NEW ENGLAND.

that produced under more natural conditions in the tobacco belts of Kentucky and Virginia.

MANUFACTURES.—The early farm industries of weaving and leather work soon began to develop. Numerous waterfalls provided power for the small mills and factories. It is a remarkable

fact that in spite of absence of coal, iron, and a dearth of essential raw materials within the New England States, this region has become one of the most important manufacturing districts of the U.S.A. In the first place this was due to the determination and skill of the early Puritan settlers, who could not hope to depend entirely on agriculture in so poor a land. Later the development of hydro-electric power from the numerous waterfalls and the nearness to the coal of Pennsylvania and Cape Breton Island aided the industries. The indented coastline provided numerous harbours, and encouraged the sea-trading by which imported raw materials could easily be obtained. The chief industries are as follows:—

(*a*) Textiles.

(*b*) Leather.

(*c*) Metals and machinery.

(*a*) Cotton, obtained from the southern states, is manufactured into high quality cloth. Great attention is paid to quality since cotton cloth can be made more cheaply in the industrial area of Alabama which lies within the cotton-growing area. The New Englander depends on the high standard of workmanship of his goods to compete with more favourable southern areas which have not the long experience and skill of the northern states. In spite of this the cotton industry has declined. In the southern states there are ten times as many active cotton spindles as in New England. The chief towns engaged in the cotton industry are *Fall River, New Bedford* (102,000), *Lowell, Pawtucket*, and *Lawrence.*

New England also manufactures woollen and worsted goods. In early days the sheep of the local farms provided the wool but now it is imported. *Boston* is second only to London as an importer of wool. The chief towns concerned are *Lawrence, Providence* (205,000), and *Lowell,* but production is declining.

(*b*) One of the greatest shoe-producing areas of the world is centred in *Boston, Haverhill, Brockton,* and *Lynn.* Large quantities of hides are imported from western U.S.A. and from overseas. From small beginnings when one man made all parts of a shoe the industry has become specialised, and shoes are mass produced in factories. But, like the textile industry, the manufacture of shoes is declining.

(*c*) New England has no mineral wealth of its own. Despite this fact an important metal industry has developed in Connecticut.

Since raw materials must be obtained from a distance and transport costs are large, it follows that only intricate goods which require great skill can be made at a profit. Such goods are watches and clocks (at *Waterbury*), jewellery (at *Providence*), engineering tools, small arms, pins, needles, household appliances, springs, and indeed almost all types of small metal goods. Aircraft and office machinery are manufactured in *Hartford* (160,000), and hardware at *Bridgeport* (156,000).

Boston (700,000) is the chief commercial, industrial, and cultural centre of the New England States and is regarded as the most "English" of American cities. It is a large port and a market for wool, fish, and leather. The town is situated on one of the few coastal lowlands and is nearer to Liverpool than Montreal or New York. Although served by three railways and several air-lines, Boston has suffered in competition with New York which has easier access to the interior of the U.S.A. through the Hudson-Mohawk Gap. Indeed, much of the foreign trade of New England is dealt with at New York rather than at Boston. Boston has many industries which include textiles (cotton and woollen), shoes, food processing, printing, shipbuilding, the manufacture of electrical machinery, electronic equipment, and chemicals.

The interior of the New England States is sparsely populated. Most of the towns lie near the south and south-east, round the coast and in the valleys where the industrial areas are situated (Fig. 29) but many of these have declined in size in recent years.

II. THE CENTRAL ATLANTIC STATES

These states may be described as the main entrance to the U.S.A. The coastline from New York to Norfolk on the southern side of Chesapeake Bay is deeply indented. Like the coast of New England, it has been submerged, but there is a narrow coastal plain which widens towards the south.

Industries and Towns

The towns situated on this indented coastline have rail and road communication with the interior by means of which products reach the coast. They also import goods from overseas, some of which are sent inland while some are used in industries at the ports. It is therefore not surprising that they have become important ports

and manufacturing centres, using imported raw materials such as South American ores, Central American and West Indian fruits, and fertilisers from Chile and Florida. Abundant power is provided by the Appalachian coalfields and hydro-electric plants. The surrounding lowlands provide vegetables and dairy produce to feed the large industrial population. The most important cities are *New York, Philadelphia, Baltimore,* and *Washington.*

New York (10,694,000) is the largest city in the world: within the metropolitan area there are 16 million people. It is situated at the southern end of the Hudson-Mohawk Gap which offers a lowland route through the Appalachians to the interior. In 1825, the Erie Canal which connects the Hudson River with Lake Erie was opened for traffic and large quantities of produce from the central lowlands used this route to New York. Later, railways and roads were built alongside the waterway and their use reduced the freight on the canal and linked the string of industrial towns—some fifty in 400 miles—which grew up in the gap.

New York has been built on three islands (Manhattan, Staten, and Long) and on the neighbouring shores of the mainland. The many miles of waterway have proved both an advantage and a disadvantage to the city. Its extensive waterfront of over 650 miles has been developed to provide piers, slipways, and docks. The main approach to the harbour from the Atlantic is by the Narrows between Long Island and Staten Island. There is also an approach by Long Island Sound. Even the largest liners are able to sail through the Narrows into the River Hudson at any state of the tide. The disadvantage of so many waterways lies in the difficulty of providing adequate transport between various parts of the city. About sixty bridges and four tunnels have been built, of which one tunnel takes the only railway from the western mainland to enter Manhattan. Since it is necessary to have good railway communications to link the docks dealing with heavy cargoes with the mainland, most of the bulk commodities such as coal, mineral ores, timber, and petroleum are dealt with either in Brooklyn or on the New Jersey shore where several main railway lines have their termini. The Manhattan waterfront, which fringes the Hudson River, is mainly used for passenger traffic. Large docks have been constructed here to berth the largest luxury liners. New York docks deal with half of the foreign trade (by value) of the United States.

New York has three airports and handles more passenger traffic than any other city in the world.

The original settlement of New York was at the southern end of Manhattan Island; it has since grown to cover a large area on Long Island, on Staten Island, and on the mainland. In Upper Manhattan lies Harlem, a district where some 250,000 negroes live in crowded

Fig. 30. NEW YORK.

tenement buildings. Greater New York has a population approaching 9 million and as the population has grown, ground space has become more and more limited. Expansion has had to take place upwards so that the city landscape is dominated by tall sky-scrapers, many with fourteen or more storeys (*see* plate opposite page 80). The Empire State Building has 102 storeys above street level and two below.

New York dominates the United States not only as a commercial and passenger port, but also as a manufacturing centre. Heavy industries such as engineering, shipbuilding, and oil refining are

mainly found on the New Jersey shore where railways serve the docks. Manhattan has lighter industries of which the manufacture of clothing is the most important; half the American clothing industry is located in this area. Other industries include printing and publishing, and tobacco and food processing. The leading banks are found in Manhattan together with the Wall Street Stock Exchange, and the offices of the chief Shipping Companies. New York is the largest financial and business centre in the world.

Between New York and Buffalo lies a vast industrial area with a dense population in the valleys of the Hudson River and its tributary, the Mohawk. Many towns benefit from the rail, road, and water communications through this "Hudson-Mohawk Gap" and from the hydro-electric power from Niagara Falls and the tributaries of the Upper Mohawk. Such towns include *Cohoes* (hosiery and knitwear), *Troy* (linen), *Rochester* (electrical engineering and optical works), *Utica* (cotton and engineering), *Schenectady* (electrical engineering), *Albany* (variety of industries), and *Syracuse* (chemicals). With this concentration of industrial towns it is small wonder that New York has become a centre for distributing their products (*see* Fig. 31).

South of New York lie the mouths of the Delaware, Susquehanna, and Potomac, and the deep indentation of Chesapeake Bay. These rivers provide natural routes into the Appalachian Valley, and their valleys are followed by rail routes to the interior.

Philadelphia (2,200,000) lies on the Delaware River near its junction with the Schuykill. The city lies about 100 miles from the Atlantic with which it is connected by a 40-ft deep channel. The Fall-Line passes through the western part of the city. Although there is no easy natural route to the west through the Appalachians. several roads and railways cross the mountains to the interior.

Philadelphia is the fourth largest city and one of the chief ports of the U.S.A. with forty miles of waterfront lined with piers and docks. It is primarily a cargo port with a considerable coastwise traffic and it has a large share in the country's shipbuilding and repair industries. Imports include petroleum, iron ore, manganese, sugar, and nitrates; exports include manufactured goods and some grain from the Middle West.

Philadelphia was founded by William Penn who planned the area which now forms the centre of the city in 1682. Around this

centre lie rows of houses, many of them slums, in which 600,000 negroes live—over one-quarter of Philadelphia's population. Beyond lie the modern suburbs and the main industrial areas. The factories depend to a great extent on imported raw materials; engineering, chemical, textile, and oil-refining industries are the most important. A large iron and steel works using imported ore has recently been established. Copper ores from the Andes and from the Western Cordilleras of North America are shipped via Panama to Philadelphia for refining. There is a motor car industry and the largest workshops making railway locomotives in the U.S.A. Crude oil is imported by sea and by pipeline from the Texas-Oklahoma oilfields to be refined and subsequently trans-shipped. Other industries include the making of radio and television sets, clothing, knitted goods, and the canning of vegetables and fruit grown on the market gardens around the city. Philadelphia has a large and important airport.

Baltimore (950,000) is situated on Chesapeake Bay some miles south of the Susquehanna River. Like Philadelphia it is a "Fall-Line city" and an important industrial centre. It is also a major seaport and airport. The harbour is equipped to deal with mineral ores, coal, and grain. Baltimore is the chief port of entry for foreign iron ore, especially from Venezuela, Chile, Liberia, and Labrador. It also imports chrome, zinc, and manganese ores, petroleum, and fertilisers—phosphates from Florida and nitrates from Chile. Tropical goods such as sugar, coffee, copra, and spices are also imported. Baltimore's more important exports include steel, coal, and grain from the interior. The town has many manufactures. Steel works utilise the imported ore and provide metal for a ship-building industry. Tin plate and copper cables are also made. Fertilisers are manufactured and foods processed. The surrounding country produces vegetables and tomatoes which are canned in Baltimore factories.

Washington (798,000), on the Potomac, is the Federal Capital of the U.S.A. It was originally built in an area of seventy square miles known as the District of Columbia (D.C.). The land was ceded to Congress by Maryland and Virginia for the purpose of providing a permanent seat of government. The White House, official home of the President, was built at Washington. The city

Above: Soil erosion, whether by wind or by water, is a major problem in the United States. The picture shows deep gullying of pasture land near San Francisco. The ravine started as a cow track down a steep grassy slope. (*United States Information Service.*)

Below: Contour ploughing and strip cultivation as a protection against soil erosion. The furrows being at right angles to the slope tend to hold storm water. The alternating strips of fallow or different crops prevent any large area being exposed to erosion at a given time. (*United States Information Service.*)

Niagara. The American Falls in the centre and the Canadian Falls on the [illegible]. The foreground is in Canada. *(United States Information Service)*

The Colorado River at Lee's Ferry, Arizona. Note the horizontal bedding of [illegible]. To this and region the absence of surface water has prevented lateral erosion of the valley sides. *(Ewing Galloway, N.Y.)*

is well planned and contains many green spaces and stately buildings and is considered the most beautiful city in the country. It is the only major city of the U.S.A. where negroes outnumber whites.

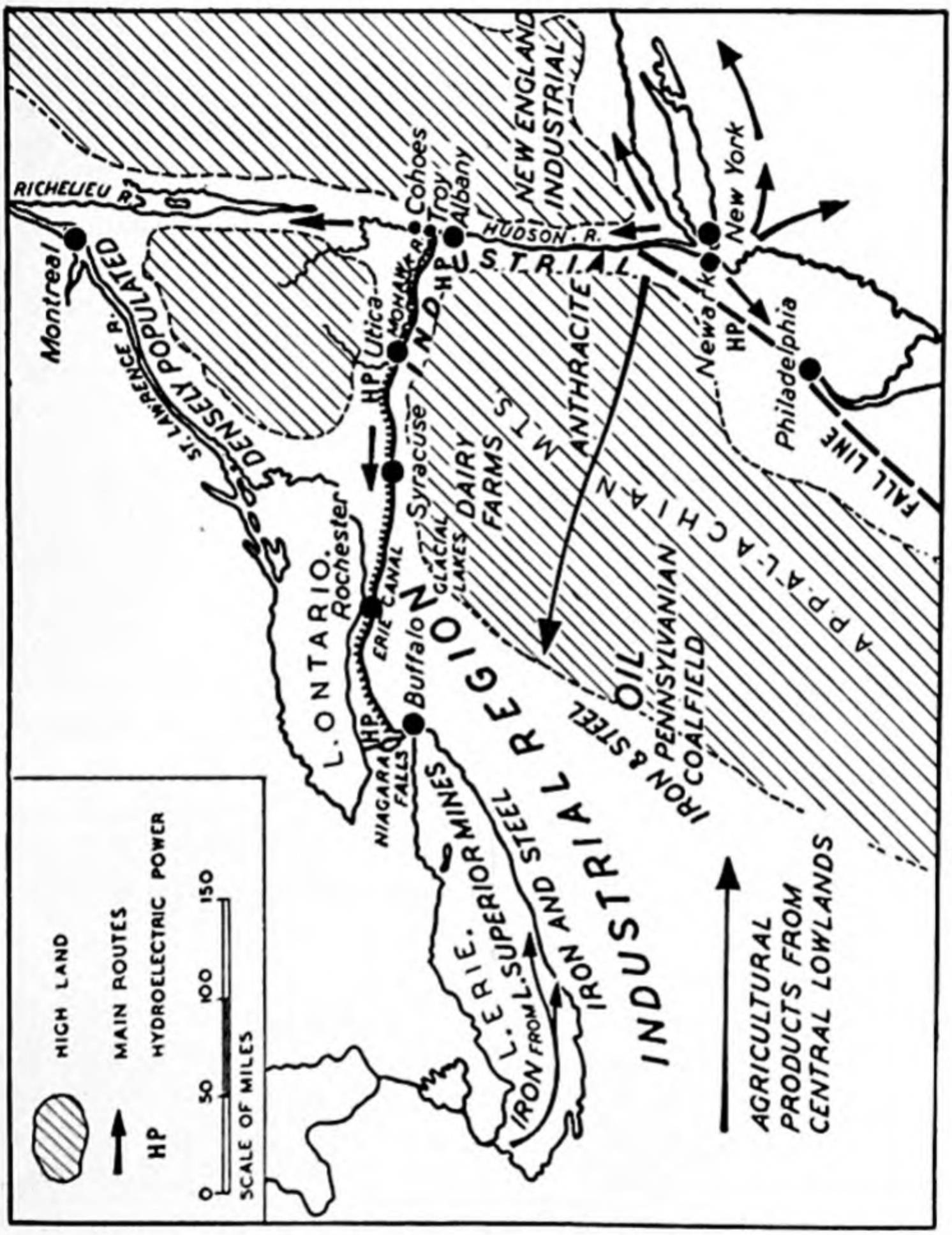


Fig. 31. The Hudson-Mohawk Gap.

At the southern end of Chesapeake Bay the James River enters the sea. Its valley provides an important line of communication with the West Virginia coalfield, whence coal reaches the coast. Its estuary provides the splendid harbour of Hampton Roads on which *Norfolk, Portsmouth,* and *Newport News* are situated. These

towns deal with much of the foreign trade of the Carolinas, which includes the export of tobacco, grain, and flour. They also export coal to South America, and to other parts of the U.S.A. Newport News is specially equipped as a coal port.

To the east of Chesapeake Bay lies the Delmarva (Delaware, Maryland, Virginia) peninsula. This is linked with Norfolk by a bridge-tunnel, a unique roadway which crosses the seventeen and a half mile stretch of water by a series of bridges linking man-made islands, and two mile long tunnels beneath the main shipping channels. It was built mainly to provide a fast car route between New York and Florida.

III. THE SOUTHERN ATLANTIC STATES

Relief and Climate

South of the Chesapeake Bay the Southern Atlantic States show marked differences from the North and Middle Atlantic States. They are composed of (1) a coastal plain fringed on the seaward side by lagoons and marshes, and sandy spits; (2) a Piedmont belt of hilly country having a heavier soil derived from the underlying old rocks. The "Fall Line" (Fig. 32) marks the transition area from the Piedmont belt to the coastal plain, and the mountain barrier of the Appalachians forms the western limit of the Piedmont.

Another marked characteristic of these Southern Atlantic States is the high summer temperature which makes it possible to grow crops such as tobacco and cotton. Farming is the chief occupation.

Agriculture

COASTAL PLAIN.—Here the soils vary but are less fertile than those of the Piedmont, and sand predominates. The fact that they are almost stoneless with a level surface makes market-gardening a characteristic industry. Tomatoes, melons, and vegetables are produced in large amounts. The use of fertilisers has greatly increased the production. The industrial North provides a ready market, although some of the produce is canned locally. Co-operative associations organise the selling and distributing of the products so that the best market can be obtained.

Pine trees grow on the sandier areas, and there is still much marsh and unprofitable land near the coast.

PIEDMONT BELT.—Tobacco is the main crop of the northern part of the area, from the James River in Southern Virginia to North Carolina. The northern edge of the tobacco country merges into one of the chief apple-producing districts of the U.S.A., which

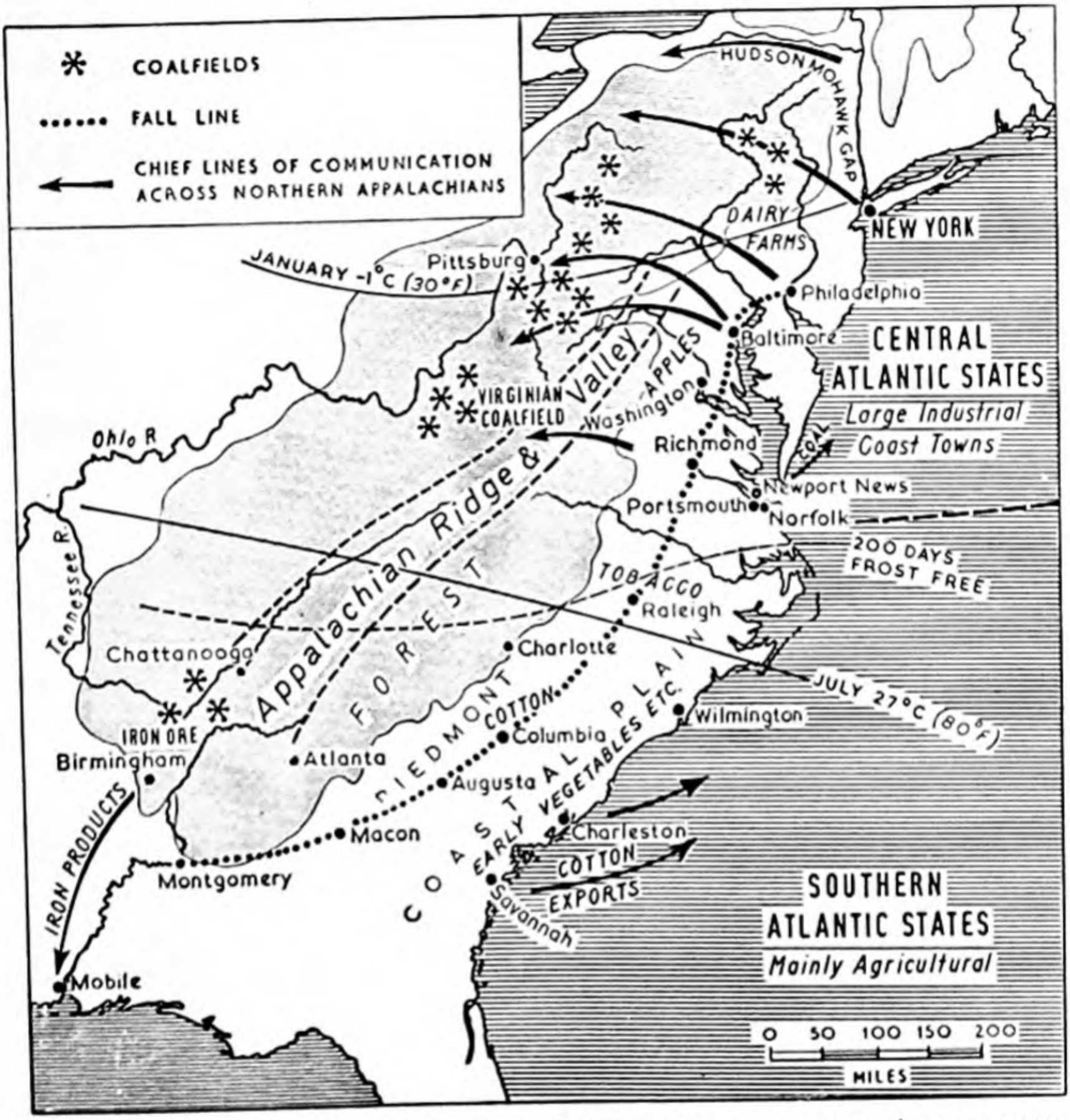


Fig. 32. THE CENTRAL AND SOUTHERN ATLANTIC STATES AND THE APPALACHIAN COALFIELDS.

provides many cases of fruit for European trade. Corn, hay, and a little wheat are also grown, and dairy cattle are reared in the northern part of Virginia. To the south of the James River cotton becomes important. It is grown on the Piedmont Plateau and the

upper part of the coastal plain of Alabama, Georgia, and the Carolinas.

Towns

Savannah (150,000) and *Charleston* are the chief ports. Cotton is their chief export and fertilisers the chief import. The most important inland towns lie on the "Fall Line" where water-power is available. Many are small industrial towns which process tobacco, manufacture textiles, and make furniture and paper using wood from the Appalachian forests.

Richmond (220,000) is situated on the James River. It is a port connected with the sea by a dredged waterway. Imports include chemicals, coffee, and sugar. Richmond has a great tobacco market and processing centre. Tobacco is one of its main exports.

Charlotte (202,000) has large hydro-electric plants. It manufactures cotton and woollen goods.

Ashville in Virginia and *Roanoke* in North Carolina have some of the largest rayon plants in the world.

Raleigh, *Augusta* (textiles), and *Macon* are smaller "Fall-Line" towns.

IV. FLORIDA

Physical Characteristics

Florida is a low peninsula consisting mainly of limestone which is covered with sand in many districts. The soils of Florida are relatively infertile, although a few areas where marshes have been drained are rich in humus. Much of the drainage is underground, and the collapse of large subterranean caverns has resulted in hollows which are occupied by small lakes, the largest of which is Lake Okeechobee. South of this lake almost all the peninsula is covered with cypress swamps known as the Everglades (*see* plate facing p. 81). This area is desolate and of little use except where reclaimed.

The east coast is fringed with numerous sandy spits which enclose salt lagoons on the landward side. Coral reef forms the narrow causeway of Florida Keys, which takes the roadway from the mainland to the naval base of Key West at its southern end. Mangrove swamps occur on the Gulf shores.

Climate and Products

Florida's chief asset is its mild climate. The warm waters of the Gulf Stream encircle its coasts and cause the winters to be warm, though occasional frosts occur when cold air currents penetrate

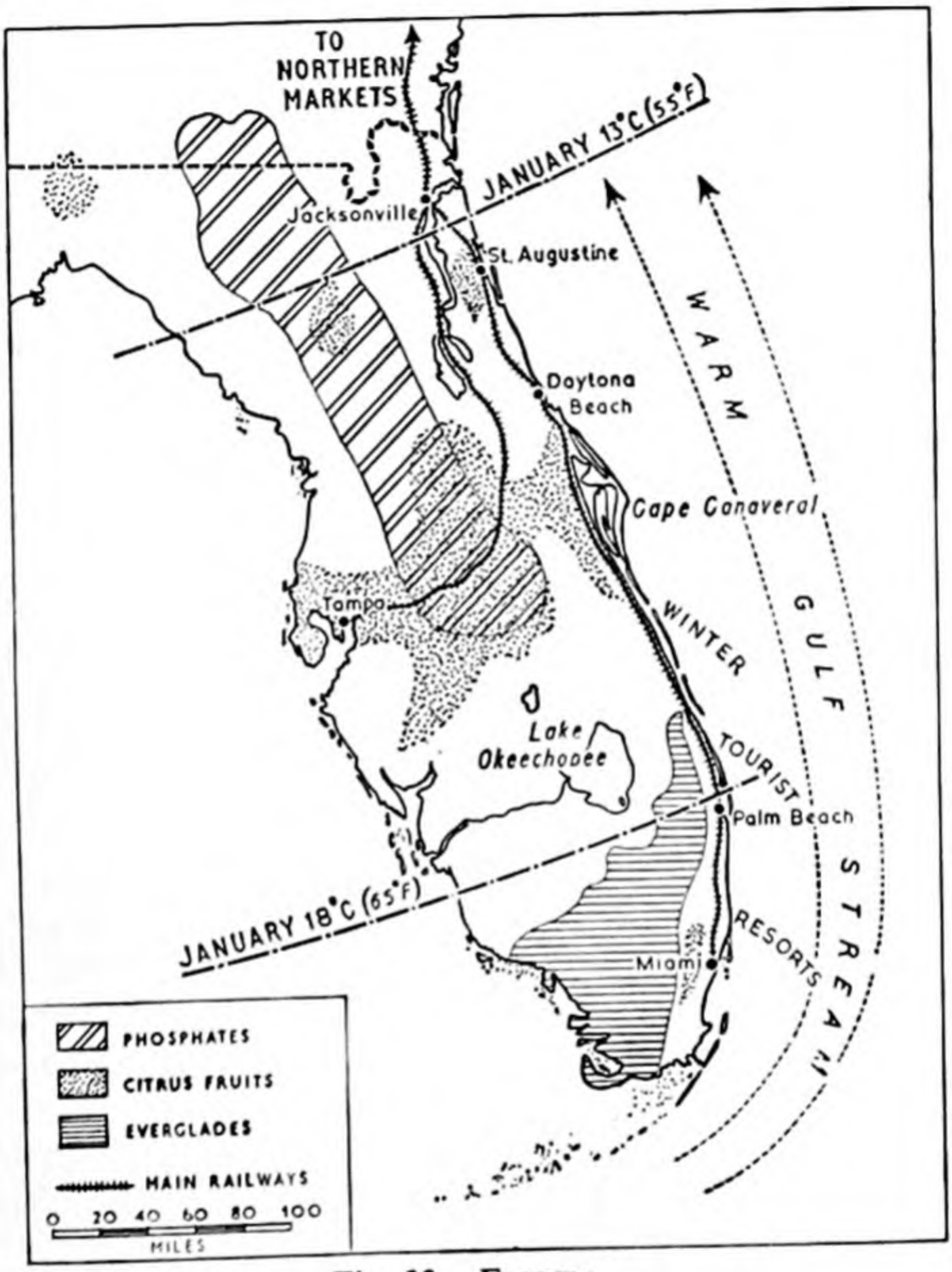


Fig. 33. FLORIDA.

from the north. The summers are hot and enervating and hurricanes sometimes do much damage, particularly in the autumn. The warm sunny winters with their low rainfall attract many tourists from the colder north who provide Florida with her greatest

source of income. *Palm Beach, Miami* (*see* plate facing p. 81), and *St Augustine* have luxurious hotels and the winter residences of American millionaires, who enjoy fishing and bathing in the warm sea water. The tourist industry is partly responsible for the fact that the population of Florida has increased more rapidly than that of any other state in recent years.

The mild climate is also responsible for an important fruit and market-gardening industry. Citrus fruits, particularly grape-fruit and oranges, are grown in central Florida in a belt stretching from the east to the west coast. Many of the citrus groves are situated on higher ground where the presence of numerous small lakes reduces the danger of frost. The higher ground also tends to escape the cold air which sinks to lower levels. When frost is expected artificial protection is sometimes given, by the lighting of oil or wood fires round the groves. Florida is the chief producer of grape-fruit in the U.S.A., even surpassing California in output. A few pineapples are grown on sandy soils near the east coast, but their cultivation is hazardous since they are very susceptible to frost. The warm winters aid the production of early crops of lettuce, tomatoes, and vegetables, which can be sold in the markets of the north when local supplies are not available. Express trains make distribution easy and rapid. Florida accounts for over 70 per cent. of the phosphate produced in the U.S.A.—one-third of the world's supply. Much is exported from *Tampa* (275,000). Pulp mills use timber from the forests of southern pines.

Miami (300,000), on the mouth of the Miami River, is connected by canal with Lake Okeechobee. It is the largest city of Florida, an industrial centre, and a noted winter tourist resort.

Jacksonville (201,000), in the north of the peninsula, is the chief port. It has cigar factories.

Cape Kennedy (formerly Cape Canaveral—*see* Fig. 33) is the main testing centre and launching site for manned and unmanned spacecraft.

CHAPTER XIII

THE APPALACHIAN REGION AND THE GREAT LAKES INDUSTRIAL BELT

Fig. 4 (Chap. II) shows that the Appalachian System may be divided from west to east into the following parts:—

(1) Appalachian Plateau (Allegheny and Cumberland Plateau).
(2) Appalachian Valley.
(3) Blue Ridge and Appalachian Mountains.
(4) Piedmont Plateau.

Surface Features and Industries

The Appalachian Plateau country rises from the Central Lowlands to a ridge of mountains known as the Allegheny Front. It is not a flat plateau but has been deeply dissected by rivers into hilly blocks, whose summits formed part of the original plateau. East of the Allegheny Front is the Appalachian Valley. The floor of this valley is broken by ridges of hills, which run parallel to the sides of the valley. Many rivers, including the Potomac and the James, rise in this valley and cut through the Blue Ridge by deep gorges, thus helping to provide means of communication from the east coast to the interior. The Blue Ridge forms the eastern flank of the valley and stands out as a bold line of forested mountains, overlooking the Piedmont Plateau.

In the northern part, in New York State, the Appalachian Plateau has been eroded by glaciers which have formed many small lakes. The area is within easy distance of New York, since two main lines of railway which connect the Central Lowlands with the coast, pass through it. This fact and the rolling character of the country have made it an important dairy farming district. Milk, butter, and cheese are produced and find a ready market in the nearby industrial centres.

From Central Pennsylvania to its southern extremity the Appalachian country is less accessible. It is cut by the valley of the Tennessee which runs parallel to the edge of the Cumberland Plateau on the west and the main ridge of the Appalachians on

the east. The area was once thickly forested, but the felling of trees by early settlers bared the soil and exposed it to wind and rain with the result that it has been eroded from the slopes and large tracts have been rendered infertile. It also increased the danger from floods. Many farms were abandoned as fertility decreased and the area became relatively unproductive.

TENNESSEE VALLEY AUTHORITY SCHEMES.—In 1933 the *Tennessee Valley Authority* (*T.V.A.*) was created by the Government in order to improve the situation. The T.V.A. developed the valley by means of reafforestation, the construction of barriers on the slopes to prevent soil from slipping, and the construction of dams across the river. Impounded water was used for the production of electricity, and scientific methods of farming were introduced. A navigable channel was made so that goods could be taken by water transport along the river.

Industry and farms have benefited by the cheap electric power available. Factories now produce aluminium and fertilisers. The power is also used in the textile manufacturing area round Chattanooga and in Alabama. Agriculture has benefited by flood control and the production of fertilisers. The scheme provides for the marketing and distribution of crops.

Timber is still produced in West Virginia, Kentucky, and in parts of Tennessee. Plantations of quick-growing southern pines are being cut for timber and for pulping to make newsprint.

The isolation of much of the Southern Appalachians has resulted in people who depend on their own little farms for almost all their necessities. Corn is their chief food. Pigs, cattle, and poultry are reared. This life has produced an independent, virile, and resourceful people similar in many ways to the Scottish Highlanders. Indeed, many of these people have Scottish and Irish ancestors.

Coalfields

The Appalachians are one of the richest sources of fuel and power in North America. High-grade bituminous coal underlies most of the plateau from Pennsylvania to Alabama; 75-80 per cent. of the coal of the U.S.A. is produced from Appalachian coalfields.

The seams of coal are almost horizontal and so near the surface that they crop out on the sides of the deep valleys and are easily worked either by driving adits into the valley sides or by

"strip-mining", the soil being stripped from the surface so that the coal seams can be worked by machines. The coal can then travel down the valley side to rail, road, and water transport.

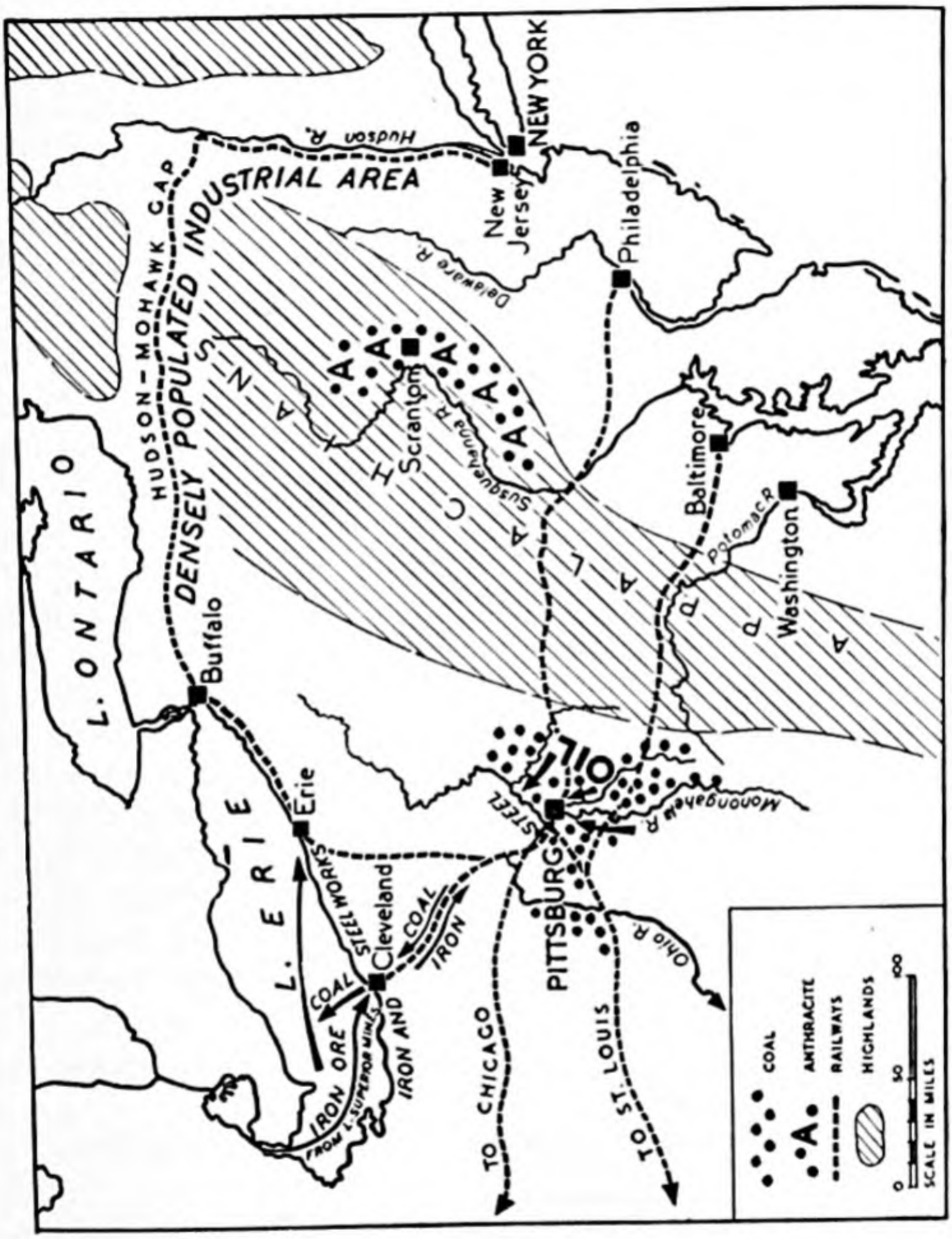


Fig. 34. THE COALFIELDS OF PENNSYLVANIA AND THE POSITION OF PITTSBURGH.

American coal mines are highly mechanised and this results in a very high output of coal per man, much higher than in British mines where the coal seams are much more difficult to work. The Appalachian coalfield has mines concentrated in three main areas—in Pennsylvania, in West Virginia and Kentucky, and in Alabama.

(i) THE PENNSYLVANIA COALFIELD.—The natural centre of this coalfield is *Pittsburgh* where a number of valleys which run through the coal seams of the Allegheny Plateau converge. It was the first coalfield in America to be worked and coal was sent to many parts of the country, much of it by way of the Great Lakes. To-day, a larger proportion is used locally.

In north-east Pennsylvania, near *Scranton*, the rocks of the Appalachians are intensely folded and the pressure has converted the coals of the district to anthracite which is more difficult to work than the bituminous coals of the Pittsburgh area. Anthracite has a high percentage of carbon and gives little smoke: it is widely used in central heating plants and is in great demand in towns where the smoke abatement laws prohibit smoking fires.

(ii) THE WEST VIRGINIA AND KENTUCKY COALFIELD.—This is now the most productive coalfield in the U.S.A. Much of the coal is easily worked by strip-mining and relatively little manpower is needed to operate the earth-moving machines on the land surface. The soil is removed, destroying the fertility of the land and this increases the danger of erosion. As a result there is unemployment and great poverty among the people, especially in Kentucky. The output is three times that of the Pennsylvania coalfield. It is good quality coal and some is sent to the Chicago area for use in the steel industry. Considerable quantities are shipped from *Hampton Roads* to the industrial coastal towns of the Central Atlantic States, to New England, Canada, and South America. Unfortunately, the local people do not benefit greatly from the productivity of the mines. The landowners receive no money for the coal since their ancestors sold the rights in the nineteenth century to mining companies.

(iii) THE ALABAMA COALFIELD.—This coalfield is centred on *Birmingham* at the southern end of the Appalachians. It has a relatively small output and most of the coal is used locally.

Industrial Areas

Important industrial areas are closely associated with each of the worked coalfields of the Appalachians, though some of them extend well beyond the actual coalfields into the Central Lowlands.

(*a*) THE GREAT LAKES INDUSTRIAL BELT.—The position of the Pennsylvania coalfield in relation to the vast waterway of the Great

Lakes has proved to be of enormous importance in the development of industrial areas which are concentrated on the lake shores and between the lakes and the Appalachian Mountains. This is largely due to the splendid facilities for water-borne transport. At one time ocean-going ships were unable to sail up the St Lawrence beyond Montreal because of rapids and Niagara Falls. To-day there are no longer obstacles. Canals and locks have been built

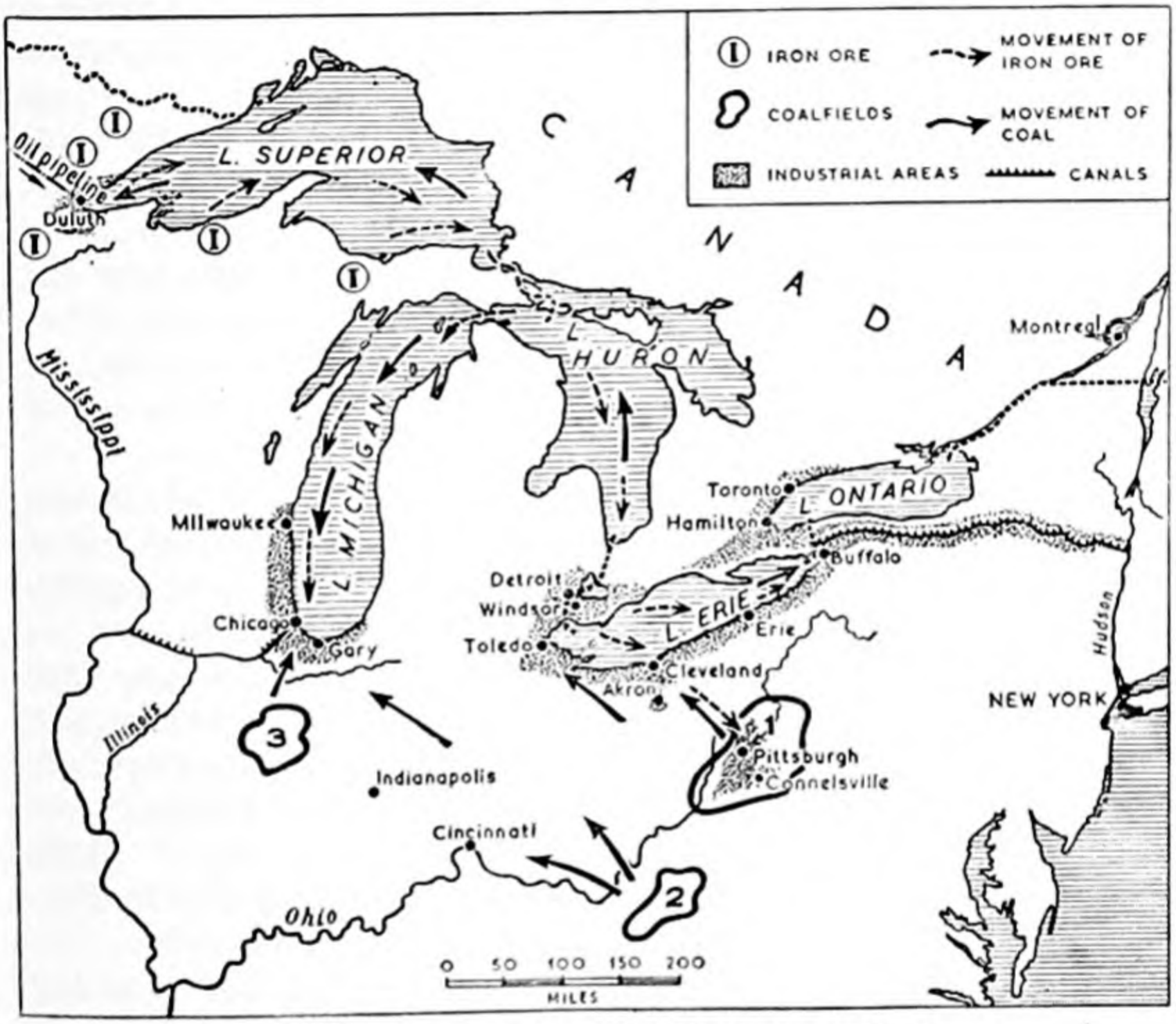


Fig. 35. THE GREAT LAKES INDUSTRIAL BELT.
1. Pennsylvania Coalfield. 2. West Virginia Coalfield. 3. Central Coalfield.

and the opening of the St Lawrence Seaway in 1959 made it possible for ocean traffic to reach the interior of the American continent. A full description of the Great Lakes and the St Lawrence Seaway is given in Chapter VI (*see* pp. 41-3 and Fig. 19).

The traffic on the Great Lakes is enormous but it is seasonal since the routes are closed by ice during the winter, usually from about the end of November until March or April. Grain, oil, and

timber pass eastward through the lakes but the largest cargoes are of iron ore from the deposits which lie to the west of Lake Superior. These supply the main steel centres of the U.S.A. and the chief port for shipment is *Duluth* on Lake Superior which is also the lakeside terminus of the pipeline from the Canadian oilfields (*see* p. 28). Duluth imports coal, and has a small steel industry. (*See* also p. 116.)

Much of the iron ore from Duluth was originally sent to *Pittsburgh* (604,000), where a steel industry had been established at an early date using local ore and limestone and excellent coking coal from Connellsville nearby. To-day ore comes from the Lake Superior mines, Labrador, and Venezuela. The modern steel industry in Pittsburgh provides the material for the manufacture of machinery. Pittsburgh is an important railway centre and has excellent communications with the shores of Lake Erie and across the Appalachians to the Central Atlantic coast ports (Fig. 34), but the city has declined in importance in recent years with the rise of new and efficient steel plants in other parts of the U.S.A.

Between Pittsburgh and Lake Erie, along the lake shores and through the Hudson-Mohawk Gap, is a densely populated industrial area. Power is provided by the Pennsylvania coal and by hydro-electric power such as that produced by Niagara Falls, while iron ore reaches the lake ports from Lake Superior mines. The area is also well situated between the lake transport system and the Hudson-Mohawk Gap which connects it with New York. It can therefore obtain a great variety of raw materials both from the interior and from foreign countries via the coast ports. Many manufacturing industries have developed, such as steel, engineering, machinery, textiles, and rubber. The chief towns are:

Cleveland (876,000), on Lake Erie, deals in iron and coal and has blast furnaces producing steel. It has other important industries including the manufacture of motor cars, chemicals, paint, and clothing. The port is linked by canal to the Ohio River.

Buffalo (535,000), another industrial centre, lies at the eastern end of Lake Erie. Formerly many export goods brought by lake transport were transferred at Buffalo to land or canal routes passing through the Hudson-Mohawk Gap to New York and the Atlantic. With the opening of the St Lawrence Seaway, this export route will probably decline slightly in importance. Lying on the iron ore

route through the lakes and near to the Pennsylvania coalfield, a steel industry has developed. Power is available from Niagara and many other industries are carried on, notably the making of machinery and flour-milling. Wheat comes by lake transport from the western prairies and Buffalo has become the largest milling centre in the country.

Toledo (340,000) lies at the western end of Lake Erie and is second only to Duluth as a lake port. It is the main coal-shipping port and manufactures components for motor cars.

Detroit (1,670,000) has a commanding position on the St Clair River between Lake Huron and Lake Erie where an easy route between Canada and the U.S.A. crosses the Detroit River. Many years ago Henry Ford built his first large factory in Detroit and the town is now recognised as the main car manufacturing centre of the country with several other large companies established there. The metropolitan area contains over 3 million people and Detroit ranks as the fourth largest industrial city in the U.S.A. Other industries include the making of metal goods, cloth, plastics, and paint. Industrial plants making car components are found in many towns in the area. *Akron* (290,000), for example, makes synthetic rubber tyres.

Some very important industrial areas cluster round the southern end of Lake Michigan. By far the largest is *Chicago* with the adjacent steel towns of Gary and Michigan City which extend along the lake to the east. This area imports coal from the West Virginia and Kentucky area and from Pennsylvania for the steel industry since the coal from the eastern interior coalfields is of poor quality. The output is very large and steel is sent to engineering works all over the U.S.A. The Chicago area is the second largest manufacturing concentration in the country (after New York) with large automobile and engineering plants (*see* also p. 118).

(*b*) THE WEST VIRGINIA INDUSTRIAL AREA.—The main industry of West Virginia is the manufacture of glass and chemicals in the valley of the River Kanawha which flows westwards from the Appalachians to the Ohio River. Local coal is used as well as natural gas and hydro-electricity and products include rayon and nylon, synthetic rubber, and a whole range of chemicals such as sulphuric acid, ammonia, and chemical salts. The main centre is at *Charleston* (90,000).

Cincinnati, which lies west of the coalfield on the Ohio River, uses Appalachian coal as a source of power. It makes machine tools, parts for motor cars and aircraft, and electrical goods (*see* also p. 118).

(*c*) THE BIRMINGHAM INDUSTRIAL AREA.—*Birmingham* (345,000) is the largest town of the Alabama coalfield at the southern end of the Appalachians. There are local supplies of iron ore and limestone, which have led to the development of an iron and steel industry. More cast iron is produced than steel and the industry is on a much smaller scale than that of the northern area. Coal and pig-iron are shipped from *Mobile Bay* to the coastal industrial towns of the Central Atlantic States and New England. The ship-building industry of Mobile uses coal and steel which are easily transported from Birmingham by the canalised Warrior and Tombigbee rivers.

The coal also provides power for the cotton and synthetic fibres textile industry in Alabama. This industry is discussed in Chapter XV.

CHAPTER XIV

THE CENTRAL LOWLANDS (1)

Surface Features

The land between the Appalachians and the steep eastern edge of the Western Cordilleras is drained by the Mississippi and its tributaries. The rocks which underlie most of this region are almost horizontal and relatively newer and softer than those which compose the eastern or western mountains (Fig. 2). In the east they form low country which rises as one proceeds westward from the Mississippi Valley to the foot of the Rockies.

(1) OZARK AND OUACHITA HILLS.—The comparative uniformity of the surface of this vast lowland is broken by the Ozark and Ouachita Hills. These consist of a dome of old hard rocks which rises through the newer rocks of the plain to a height of some 1,800 ft. The hills are forested and dissected by streams which have carved out deep valleys. The area is quite distinct in scenery and products from the surrounding area. The inhabitants are farmers whose produce varies from patches of maize and vegetables to pigs and cattle. The farms are small and there is not much surplus for trade. Lumbering occupies the farmer in winter and provides oak railway sleepers and pit-props for sale. Zinc and lead are mined in several localities. The population is scanty and scattered. There are no large towns.

(2) THE LOWLANDS OF THE MISSISSIPPI BASIN.—This lowland may roughly be divided into two parts by the line of longitude 100° W. which almost coincides with the annual isohyet of 20 ins. in the south and 15 ins. in the north. The land to the east has an adequate rainfall and is the most important agricultural area of the U.S.A. For this reason it is referred to in this chapter as the *Agricultural Lowlands*.

To the west of the line the rainfall is insufficient for agricultural purposes unless aided by irrigation or dry farming.

Much of this western part of the Mississippi Basin is over 3,000 ft in height; it is usually referred to as *The High Plains* (Great Plains).

Minerals of the Central Lowlands

COAL.—Besides the Appalachian coalfields, coals of lower quality are mined in surface workings in Illinois, Indiana, and west Kentucky. This coal is cheaply worked and much money has been spent on research in methods of marketing the coal, so that it may be clean to handle and free from smoke. This is necessary since some towns, like St Louis, have laws limiting the production of

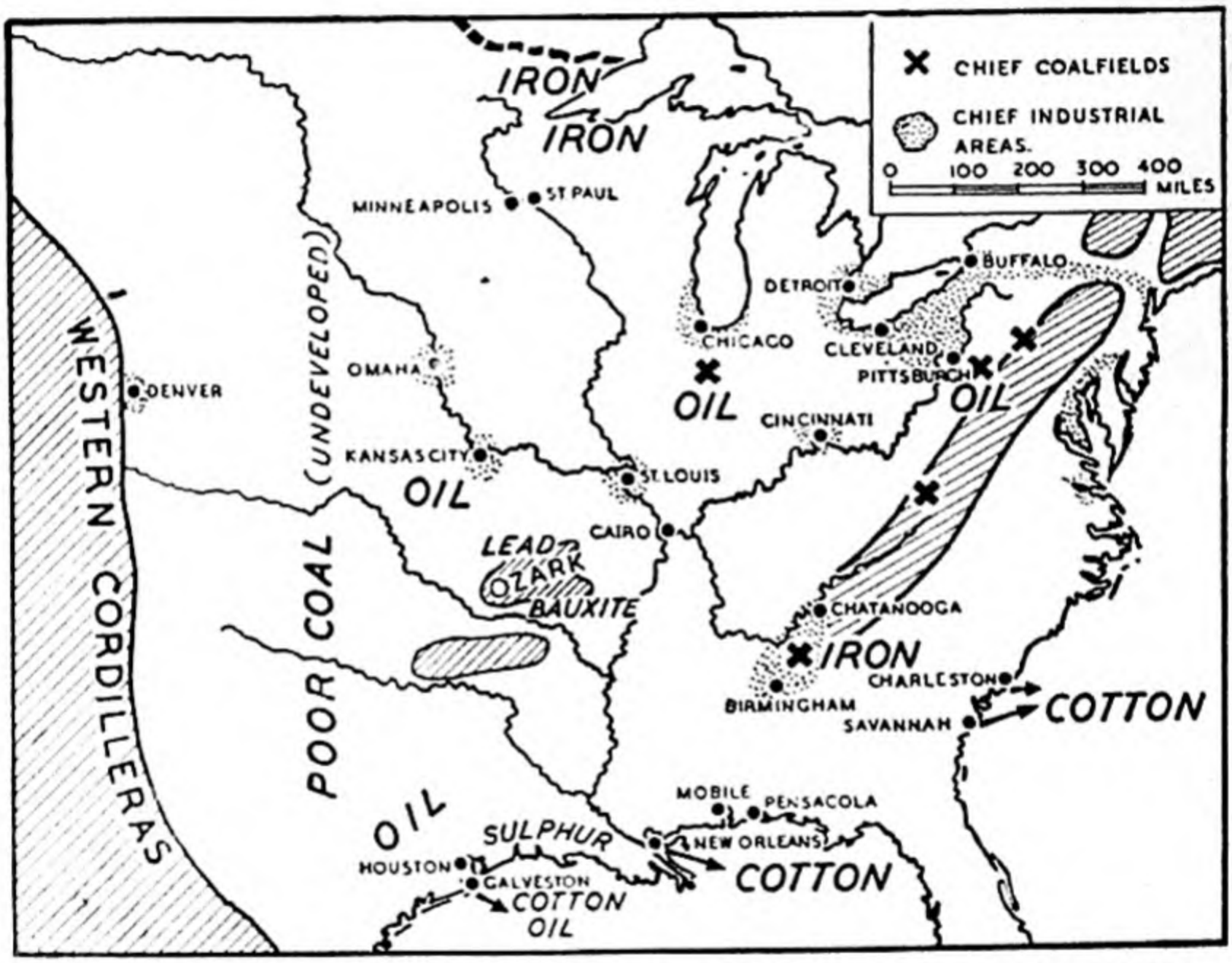
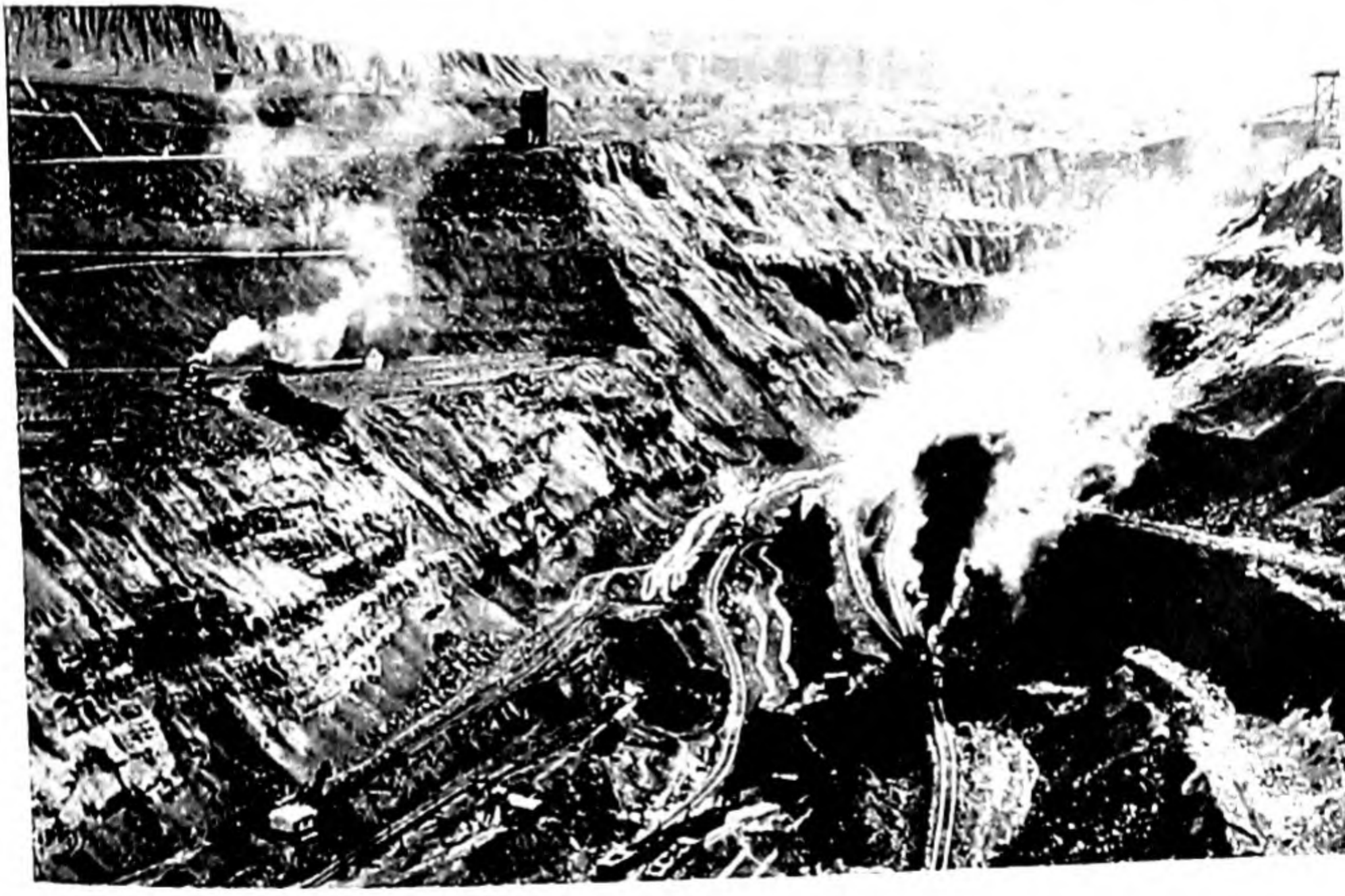


Fig. 36. THE CENTRAL LOWLANDS: MINERAL WEALTH AND CHIEF INDUSTRIAL AREAS.

smoke. Low-grade coal is also mined in Iowa, Kansas, and Missouri.

Coals of inferior quality also occur in Oklahoma and Texas but are not extensively worked.

IRON ORE.—One of the largest and richest iron ore deposits is mined round the western end of Lake Superior. The ore occurs in huge "pockets" so near the surface that it may be dug out by steam shovels (*see* plate facing page 112). Its nearness to the



Above: Pittsburgh, the great coal-mining and steel-making town in Pennsylvania. Here the Monongahela and Allegheny Rivers unite to form the Ohio River. (*United States Information Service.*)

Below: A large part of the iron ore used in the United States comes from open-pit workings like this near Lake Superior. (*United States Information Service.*)

Above. Part of the Union Stockyards at Chicago. These cover 320 acres and form the largest cattle-collecting centre in the U.S.A. (*United States Information Service.*)

Below. The commercial area of Chicago. The Chicago River can be seen (foreground and right) and the shore of Lake Michigan (top left). (*United States Information Service.*)

water transport of the Lakes makes it possible to move the ore cheaply to many lakeside steel works. Much of the low-grade ore is concentrated into pellets containing a higher proportion of iron and these are stockpiled in winter for shipment in spring when the ice retreats from the Lakes.

Iron is mined on the Alabama coalfield where the chief smelting area is round Birmingham.

OIL.—The most important oilfield of the U.S.A. is situated in Oklahoma and Texas. Oil also occurs near the coast of Texas.

Pipelines take crude oil to refineries at Houston, Galveston, and New Orleans on the Gulf Coast (*see* Fig. 39), to inland towns such as Baton Rouge on the Mississippi, and from Texas, across Missouri, Illinois, Ohio, West Virginia, and Pennsylvania, to the refineries of Philadelphia and New York. Oil is also sent to the industrial north-east by rail-tank car, by boat up the Mississippi, and by coastal barges which ply along the canalised waterway (Intracoastal Waterway) which runs inshore along the edge of the Gulf as far as Florida where the oil is transferred to pipelines. Ocean-going tankers carry oil from the Gulf refineries to other countries. By-products of oil are used in the production of synthetic rubber at Port Neches on the Sabine River. The state of Texas produces one-third of the nation's oil.

There is also an oilfield in Pennsylvania near the Northern Appalachians, but this is now becoming less productive. Natural gas is obtained from oil wells in this district. Natural gas from the oilfield is widely distributed by pipeline for domestic and industrial purposes. In several places the rare gas, helium, which is used in the power units of rockets, is extracted from the natural gas.

BAUXITE AND SULPHUR.—Bauxite, the ore from which aluminium is extracted, is obtained from Arkansas. The world's chief sulphur producing area occurs along the Gulf Coast in Louisiana and Texas. *Galveston* is a great sulphur port.

THE AGRICULTURAL LOWLANDS

Climate Factors

These lowlands stretch through nearly 20° of latitude—approximately twice the distance from the north of Scotland to southern

England. While the rainfall decreases from east to west it is everywhere sufficient for agriculture. The temperature conditions, however, differ widely from north to south, especially in the winter. Winters are so severe in the northern part that cultivation of crops is only possible in summer whereas the district round the Lower Mississippi is available throughout the year. As one passes from

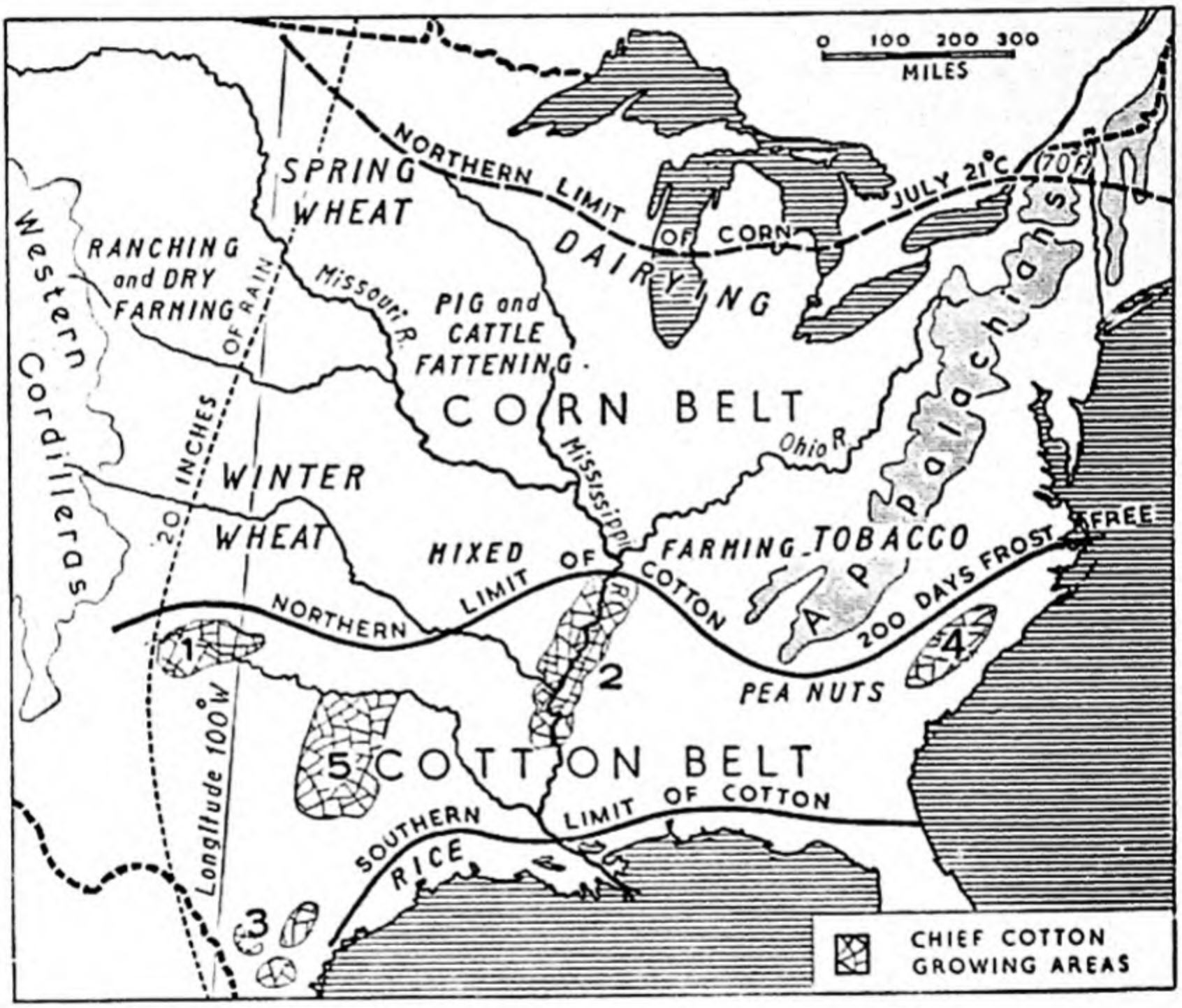


Fig. 37. THE CENTRAL LOWLANDS: Crop Belts.
The chief cotton growing areas shown above are listed on page 121.

north to south there is a marked change in the types of crops most widely grown. It is therefore possible to divide the area into a series of belts which stretch from east to west. In each belt one crop is more characteristic than others, although the belts merge into one another so that it is not possible to define them by lines. In a broad way the following belts may be recognised (Fig. 37):—

(*a*) Spring Wheat and Dairying Belt. (*b*) Maize (Corn) Belt.
(*c*) Cotton Belt. (*d*) Tobacco Belt.
(*e*) Sub-tropical Belt of the Gulf Coast.

(*a*) The Spring Wheat and Dairying Belt

The area where spring-sown wheat is the chief crop is a continuation of the Canadian wheat lands (Canadian Prairies). *See* Chapter VIII. To the south it merges into the Maize Belt and to the east, where rainfall is greater, fodder and hay as food for dairy cattle gradually take the place of wheat as the most important crop. The western limit of the belt is approximately determined by the 20 in. isoyhet, for, while 15 in. of rain a year may be sufficient to produce wheat in Canada where summers are cooler and evaporation less, 20 in. is sometimes too low a rainfall in Kansas.

The chief reasons why wheat is so extensively grown in this area are as follows:—

(1) The soil is fertile and easily cultivated;

(2) The relief is flat or gently rolling plains which were once natural grass lands;

(3) Most of the rain falls in summer when the wheat is growing and the dry autumns are good for harvesting the grain;

(4) There is good rail and water communication to the industrial areas farther east and to the coasts.

Cold winters make it impossible to sow the wheat until the spring when the snow cover melts. Even then, the weather is uncertain and drought may ruin the crop just as too much rain may damage it by promoting the growth of fungi known as "rusts". In the western part of the area, ground is frequently left fallow for a year and the rainfall conserved in the soil to aid in the growth of the following year's crop. Special drought-resisting types of wheat are also used. Much of the wheat grown in the U.S.A. is needed for home consumption in the densely populated industrial areas, and little is normally exported. While some of the grain is transported by the excellent rail service, much of it is taken to Duluth, Chicago, and other lake ports and sent by way of the Great Lakes.

Oats and fodder crops are also grown in most parts of the Spring Wheat Belt, more particularly to the east. In the southern part of the belt maize is cultivated for fodder. Experiments have been

made to produce quick-maturing types of maize which will grow further north. Maize grown in the Wheat Belt is usually cut up when green and made into silage. Sunflowers are also grown for cattle food and treated in much the same way as maize.

To the east where fodder is more extensively grown there is a large dairy industry which produces milk, butter, and cheese. Wisconsin is the chief dairying state of the U.S.A. Potatoes do well in the lighter soils almost anywhere in the hay and dairy districts.

TOWNS OF THE SPRING WHEAT AND DAIRYING BELT.—The twin cities of *Minneapolis* and *St Paul* with a population of 1½ million form the most important urban area in the Spring Wheat and Dairying Belt. They grew up where the St Anthony Falls obstructed navigation up the Mississippi. The Falls provide power for the numerous industries of which the chief is flour-milling and a bridge across the river made it an important route centre. There are also engineering and boot and shoe industries.

Duluth (110,000), at the head of navigation of Lake Superior, is the leading port on the Great Lakes and the sixth largest port in the world in terms of tonnage handled. It ships wheat and timber from the nearby forests, iron ore from the Lake Superior iron deposits (*see* also p. 107), and oil brought by pipeline from the Canadian oilfields. It has a small steel industry.

Superior, south of Duluth, is a great wheat port with huge grain storage silos.

(*b*) The Maize (Corn) Belt

Maize is the most widely grown cereal in the U.S.A., and about three-quarters of the world's supply is produced there. Maize is a native plant of the New World and was the chief food crop grown by the original Indian tribes. The map (Fig. 37) shows the principal areas where maize is the main crop, but it is grown anywhere south of the July isotherm for 21° C. (*70° F.*) Iowa and Illinois have the greatest production. To the north of the main Maize Belt, where the summers are cooler, the maize is cut green for silage.

CLIMATIC FACTORS NECESSARY FOR MAIZE GROWING.—Maize requires a higher temperature than wheat and can stand little frost. It requires a day temperature of 21-27° C. (*70-80° F.*) for the three

summer months, June, July, and August, and during this period night temperature should not fall below 13° C. (55° *F.*). The rainfall should be showery, with at least 4 in. falling in July, which is a critical month. Too much or too little rain in this month may cause a poor yield. Showery weather allows plenty of sunshine which is necessary for ripening the corn. These conditions are characteristic of the main Maize Belt where the gently rolling topography and the fertile, almost stoneless soils are an important asset.

CULTIVATION.—The seeds are planted in February in the southern part of the belt, but as late as May in the north. When ripe, about August, the maize is often allowed to stand in the fields for weeks or months without spoiling, whereas wheat must be harvested as soon as the grain is ripe.

USES OF MAIZE.—Farms in the Maize Belt use the grain chiefly as food for pigs and cattle which are fattened and sent to meat-packing centres such as Chicago, Cincinnati, Kansas, and Omaha. These larger centres are declining in importance to-day as more and more smaller packing plants grow up throughout the Maize Belt. The farmers also grow fodder crops—alfalfa, lucerne, and oats—to provide winter feed for the growing animals and for fattening purposes. About half the pigs ("hogs") of the U.S.A. are born and reared in the Maize Belt, millions of them in the state of Iowa alone! At one time cattle were brought from the cattle ranches in the western Great Plain and then fattened in the Maize Belt before being sent to meat factories but this practice is declining: more cattle are bred for fattening within the maize-growing areas. Approximately one-third of the cattle of the U.S.A. are fattened in this area. Little of the maize grown in the main belt is used for human consumption or is available for export as grain; it is much more profitable to turn it into meat products and thus increase its value.

Bacon, ham, lard, and tinned meat are produced at the meat factories, and every part of the animals is turned into something useful. The blood is made into a fertiliser.

Soya beans are now an important crop in the agricultural lowlands. Most of these are harvested in the Maize Belt, in Illinois, Iowa, Indiana, and Ohio. The chief centre for extracting the oil from the beans and for preparing bean-meal for human and animal consumption is in central Illinois.

TOWNS OF THE MAIZE BELT.—The chief towns have grown up on natural routes such as are provided by rivers and lakes.

Chicago, with a population of over 3½ million, grew up on the southern tip of Lake Michigan at a nodal point for east-west traffic (*see* plate facing p. 113). An old glacial channel, now followed by the Illinois and Michigan Canal and by railways, provides a route from Lake Michigan to the Mississippi River. Chicago has developed into a great lake port, railway centre, and airport. Many railway lines converge on the city, making it one of the biggest railway centres of the world. Raw materials can thus easily reach the town and feed its numerous industries. Pigs and cattle fattened in the Maize Belt are slaughtered in its big abattoirs and prepared for food in the large meat-packing factories. Bulky products like timber, grain, and iron ore from the iron deposits round Lake Superior arrive at Chicago by lake. Coal is easily and cheaply obtained from the neighbouring Illinois-Indiana coalfield and provides power for its industries such as meat-packing, agricultural machinery, and railway engineering. Although its large population consumes most of its manufactures there is a surplus for distribution to other areas by the Great Lakes and the excellent railway system. In spite of its reputation for underworld activities, Chicago is well known for its universities, museums, libraries, and art galleries.

Milwaukee (750,000), on Lake Michigan, is less favourably situated than Chicago. It is a wheat port and has steel, automobile, electrical, and engineering industries as well as breweries and leather tanneries.

St Louis (760,000), situated at the confluence of the Mississippi and Missouri, is an important railway centre. As in many other towns in the Maize Belt, meat-packing is an important industry. Being near the Illinois coalfield and the mineral ores of the Ozarks, St Louis has large smelting works. A good supply of electric power has made it possible for St Louis to produce aluminium on a large scale from the bauxite ore of Arkansas and to establish chemical industries. The port of St Louis handles cargoes of oil, grain, sulphur, coal, and sugar, carried along the river.

Cincinnati (503,000) on the Ohio, and *Kansas* and *Omaha* on the western edge of the Agricultural Lowlands, have large meat-packing industries.

Indianapolis (477,000), an important commercial centre with a considerable negro population, has meat-packing plants and engineering works which make motor car parts.

RIVER TRAFFIC ON THE RIVER MISSISSIPPI

Many of the large towns and cities of the Wheat and Maize Belts, and of the Cotton Belt described in the next chapter, have grown up on the River Mississippi or on one of its tributaries. This is because "Ol' Man River", as the Mississippi is sometimes called, has always been of immense importance as a water highway—never more so than to-day.

At one time shallow-draught steam paddle boats carried goods and passengers. Some were even fitted out as travelling theatres or "showboats". To-day, most of the traffic consists of powerful diesel-driven vessels which take strings of barges down-river to New Orleans with motor cars, coal, corn, and cotton for export, or up-river to industrial areas with food and raw materials—especially oil and sulphur. This form of transport is cheap and efficient since thousands of tons can be taken in a single "tow". It is well worth facing the navigational hazards of the Mississippi—its winding course, its constantly shifting mudbanks, and its devastating floods. Between St Louis and Minneapolis navigation is only possible because of a stairway of locks which raises shipping over 400 ft in 600 miles. Additional locks are now under construction which will extend navigation even further north. The Missouri tributary also carries considerable barge traffic.

For more than two centuries efforts have been made to keep the river within a definite course by building protective banks or levees, and the work still goes on. Navigation to-day is made easier by a line of buoys which marks a channel kept deep enough for boats by constant dredging. Even so, regular bulletins of information about the condition of the channel are sent by radio to the captains of the tow-boats which move north and south along its course. This traffic between the industrial cities of the north and the Gulf port of New Orleans carries nearly one-tenth of the nation's goods and results in an export of over 30 million tons of river-borne produce every year.

CHAPTER XV

THE CENTRAL LOWLANDS (2)

(*c*) The Cotton Belt

The United States is the world's chief producer of raw cotton. About one-third of the crop is exported. The map (Fig. 37 on p. 114) shows that the Cotton Belt is situated in the southern part of the

World Production of Raw Cotton, 1964-5

Figures from *The Statesman's Year Book*, 1967-8.

Country	Production in Thousands of Bales	Size of Bale	Production in 1,000,000 lb.
The United States	15,200	500 lb.	7,600
U.S.S.R.	8,300	478 lb.	3,967
China	5,500	,,	2,629
India	4,750	,,	2,261
Mexico	2,400	,,	1,147
Egypt	2,323	,,	1,120
Brazil	2,200	,,	1,052
Pakistan	1,675	,,	800
Turkey	1,500	,,	717
Sudan	700	,,	334
Peru	650	,,	311
Argentina	600	,,	287

Mississippi Basin, but areas of greatest production are now moving west of the Mississippi River. The states of Texas, California, Arizona, New Mexico, and Oklahoma furnish more than half the crop, most of it grown under irrigation on large, efficient, and heavily mechanised farms. Texas produces more than twice as much cotton as any other state.

FACTORS WHICH LIMIT THE COTTON BELT. (i) *Climate*.—Since cotton is a sub-tropical plant, its cultivation is limited by climate. The plant is easily damaged by frost, and therefore the belt is bounded on the north by the line which joins places having an average of 200 frost-free days in a year. It also requires a mean temperature of at least 25° C. (*77° F.*) during June, July, and August. Cotton is also affected by rainfall conditions. To the west the belt is limited by the 20 in. isohyet, since this is the minimum rainfall required for the growth of cotton without irrigation. Seeds are sown about March or April. During the growing period, March to August, showery conditions such as those which characterise the Cotton Belt, are ideal, since the sunshine which prevails between the storms is necessary for ripening the crop. After August, when the cotton is ready for picking, the weather should be drier. Heavy rains would then spoil the exposed fibres. The Gulf Coast is unsuited to cotton growing since its rainfall of over 60 in. a year, combined with high temperatures, causes the cotton plant to grow tall and produce few bolls. The Gulf Coast also has a wet autumn, which is undesirable weather for the picking season.

(ii) *Soil Conditions*.—Cotton will grow in a variety of soils, but it soon exhausts the fertility unless manures are applied. For this purpose various fertilisers are used, such as Florida phosphates, Chilean nitrates, basic slag from the iron smelting works round the Lakes and animal refuse from the abattoirs of the Maize Belt. Cattle are frequently turned into the idle cotton fields in winter and help to increase the fertility of the soil.

Certain areas have soil conditions which are especially favourable to cotton. They are shown on Fig. 37 (p. 114).

(1) The Red Prairies of north-west Texas.

(2) Mississippi Valley.

(3) The Coastal Plain of Texas.

(4) The inner Coastal Plain of North and South Carolina.

(5) The Black Prairies of Texas.

In these areas the soil contains clay and lime which produce a fertile marl on which cotton thrives. Lighter soils are not so suitable. The sandy soils in the coastal area of the South Atlantic States limit the Cotton Belt on the east.

(iii) *Labour Conditions.*—Not all the seed pods which contain the cotton fibre—"bolls" as they are called—ripen at the same time. Yet the bolls should be picked as soon as the fibres are exposed. So hand-picking has been the common practice. The high temperatures during the picking season make the work difficult for white labourers, who also require higher wages. To solve this difficulty, negro slaves were introduced into the cotton plantations in the seventeenth and eighteenth centuries. Since the abolition of slavery

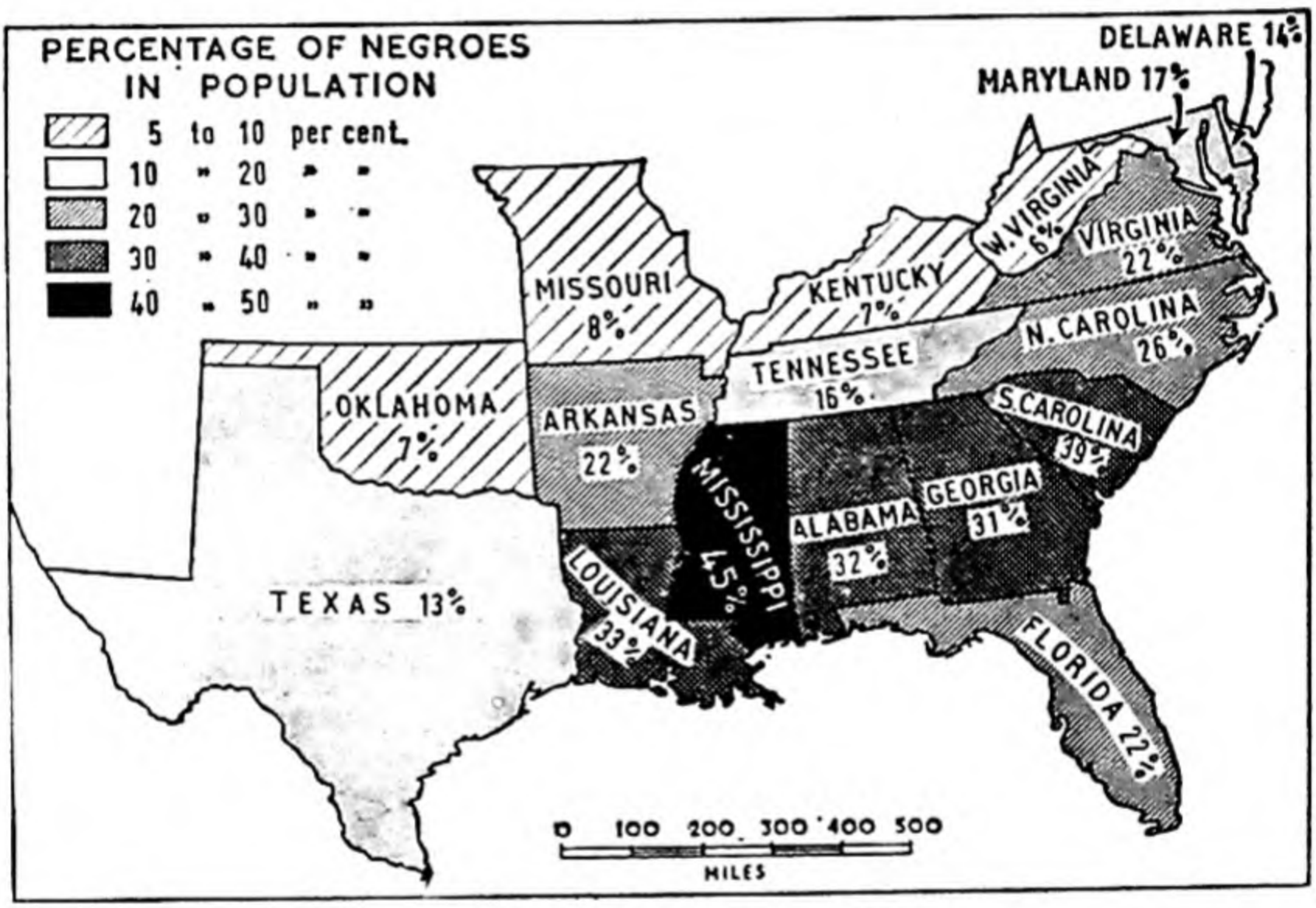


Fig. 38. THE NEGRO POPULATION.

their descendants remain to work on the plantations for lower wages than would be paid to whites. In the Mississippi flood-plain up to 50 per cent. of the population may be negroes. In Texas, however, the negro population is a little less than 13 per cent. Negroes not only work for white owners, but many of them rent and cultivate small plantations for themselves. While much cotton comes from large farms in Texas, a great deal is grown by tenants called share-croppers who surrender part of their crop in lieu of rent. Most of these tenant farms are small family units which are ill-equipped through lack of capital. The farmer, often a negro,

may keep a few cattle, pigs, and poultry and grow food crops in addition to cotton.

Although much of the crop is still hand-picked (*see* plate facing p. 128), mechanical pickers are increasingly used especially on large-scale farms. This has reduced the amount of labour required and has resulted in serious unemployment. In desperation many negroes have migrated to the more highly paid industrial areas of the north.

SOME DIFFICULTIES WHICH HINDER COTTON CULTIVATION IN THE U.S.A. (i) *Boll-Weevil.*—Millions of bales of cotton are destroyed annually by a small beetle called the boll-weevil. It lays its eggs in the bud on which it feeds and thus causes the flower to fall off before producing a boll. This pest is met with throughout the Cotton Belt, but especially in the wetter parts. Cotton fields are sprayed with arsenic compounds when the buds are forming in order to destroy the weevil. Low-flying aeroplanes are often used for this purpose on the larger plantations.

(ii) *Soil Erosion in the Cotton Belt.*—Heavy rains have been responsible for removing the soil from sloping cotton fields. Enormous damage has been done, particularly on the Black Belt of Alabama and in the state of Mississippi. Once the rain channels are cut in the bare fields they tend to grow bigger in subsequent storms unless measures are taken to remedy the damage at an early stage. Building dykes and ploughing the furrows parallel to the contours help to prevent the removal of the soil.

(iii) *Floods.*—The Mississippi delta area, south of Cairo, sometimes suffers from disastrous floods. The river meanders across its flood-plain and is actually often flowing at a higher level than the surrounding plain. Levees or dykes have to be built to restrain the river, and are sometimes 10-15 ft higher than the surface of the plain even a mile or two from the river. In spring the Ohio and Tennessee rivers bring down large quantities of water. Lesser quantities are contributed by the west-bank tributaries. Exceptional rainfall may bring so much extra water from both sources that it breaks through the levees and destroys much property. The Federal Government is spending much thought and money on drainage and protective schemes to lessen the peril.

MARKETING OF COTTON PRODUCTS.—About one-third the cotton fibre produced is normally exported to textile manufacturing

countries such as Great Britain, Germany, France, and Japan. Galveston, Houston, and New Orleans are the chief exporting ports, although cotton is also exported from Mobile, Savannah, and Charleston. The U.S.A. consumes about half the fibre produced. It is moved from the plantations to cotton gins where the seeds are removed and the fibre compressed into bales. It may then be sent by rail and river to inland markets such as Cairo, Memphis, and Vicksburg and thence to the above-mentioned sea ports for coast-wise transport to New England and the industrial north-east.

Cotton seed oil and cotton seed cake are other products from cotton.

COTTON MANUFACTURING IN U.S.A.—There are two main areas where cotton is manufactured in U.S.A.:—

(*a*) New England States (pp. 90-1).

(*b*) Southern Appalachian area of North and South Carolina, Alabama, and Georgia.

The southern area now takes a larger proportion of the cotton fibre than New England. The southern area has many advantages over New England in that it can employ cheap negro labour and is nearer to the area where the cotton is cultivated. It is also near to the Alabama and Virginia coalfields, which provide important sources of power. Both areas have an abundant supply of water-power now used for hydro-electricity. Charlotte, in North Carolina, has several large electric plants. The U.S.A. Government is also generating electric power in the Tennessee Valley, as part of the T.V.A. scheme for the development of that area. (*See* Chapter XIII, p. 104.) There are nearly 1,000 cotton mills in the Piedmont region of Georgia and South Carolina and this has become the chief cotton manufacturing area of the U.S.A. Synthetic fibres are taking the place of cotton in some of the textile mills of the south, especially in South Carolina. The manufacture of such fibres (*e.g.* rayon, nylon, orlon) based on chemicals and wood-pulp, is a comparatively recent development in this area.

OTHER FARM ACTIVITIES OF THE COTTON BELT.—Cotton is no longer the principal crop in the south-east of the Cotton Belt. The sandier soils are less suited to cotton. Originally many of these areas bore pinewoods, which still provide timber in some areas. Peanuts (ground-nuts), which bury their seeds in the ground to

ripen, like light soils, and are grown in the south of Alabama, in Texas, and other areas. The oil from these "nuts" is used in the manufacture of margarine.

Everywhere, maize is the chief cereal grown, but winter wheat is grown in the northern part of the belt. To the west, drought-resisting plants like sorghum replace much of the maize. Fodder crops and vegetables are widely cultivated. Soya beans are frequently grown between the rows of maize in North Carolina and Louisiana.

In recent years increasing numbers of cattle have been reared for meat or as dairy animals. At one time cattle suffered from disease brought by the "tick" insect. Modern methods of disinfecting the animals have done much to counteract its ravages, while the growing of fodder crops which can be stored in silos has improved the food supply for the cattle. Cross-breeding of the cattle (mostly of British breeds) with an Asiatic Bramah strain has resulted in a type of animal more suited to the southern climate. Dairy farming has increased in importance and is likely to continue to expand as the standard of living rises. In spite of other products, the prosperity of the cotton farm depends largely on the prices to be obtained for raw cotton. Since these vary very much from year to year the farmer has no secure income and is often poor. The modern tendency to vary the types of farm products is therefore good, since if one crop fails others may make up the deficit.

(*d*) The Tobacco Belt

To the north-east of the Cotton Belt there is a large area in Kentucky, Virginia, Maryland, and North Carolina where tobacco is the chief cash crop. The leaf is picked and sent to nearby market centres for curing by artificial means. Richmond, on the James River, and Louisville and Cincinnati on the Ohio have large tobacco factories.

(*e*) The Sub-tropical Belt of the Gulf Coast

CLIMATIC FACTORS.—Southern Texas, Louisiana, and Mississippi State have a typical sub-tropical climate with high summer temperatures and usually warm winters. The annual rainfall is over 60 in. and well distributed through the year. Destructive tornados sometimes do much damage. Cold waves may occur in winter, bringing the temperature down below freezing point, thus causing

difficulties in the cultivation of perennial crops such as sugar-cane.

CROPS AND PRODUCTS.—Sugar-cane is produced on the coast of Louisiana, but the plant needs protection during the winter months. Only a small proportion of the cane sugar used in the U.S.A. is produced there.

On swampy land near the Mississippi delta rice is cultivated. As in the Far East, irrigation is necessary, but in the U.S.A. modern machinery is used for cultivation and harvesting of the crop.

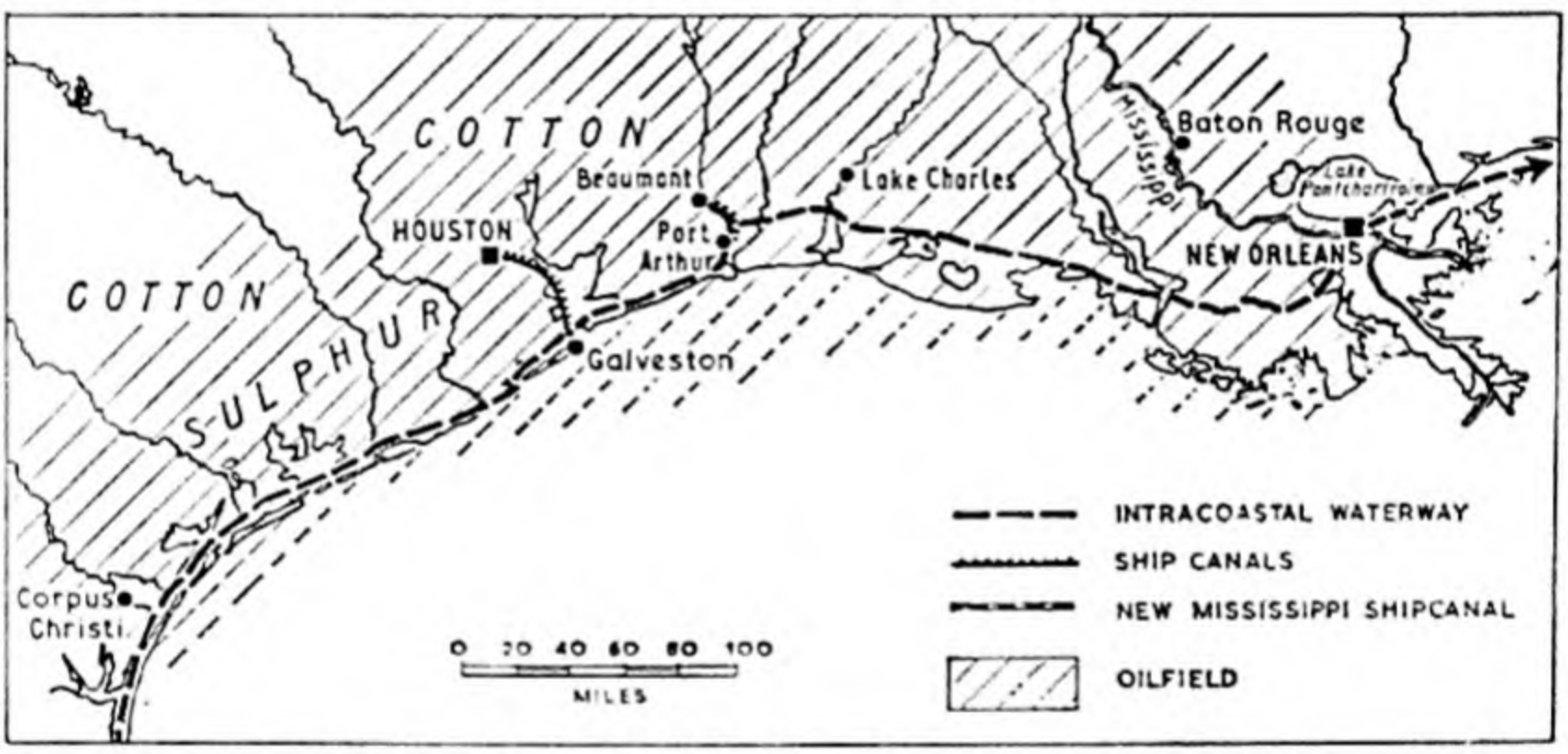


Fig. 39. THE INTRACOASTAL WATERWAY.

Cattle are also reared to supply local needs of meat and dairy produce. The industry is always hampered by the dangers of disease due to the sub-tropical climate. Early vegetables and fruits are produced in large quantities in Louisiana and exported to the northern industrial area.

To the east of the Mississippi pine trees grow on the sandier soils. These provide about half the turpentine and rosin required in the U.S.A. as well as wood-pulp for the paper industry.

INDUSTRIES.—In recent years industry has become increasingly important in the southern states. The cotton textile mills of Alabama have already been mentioned (p. 124). The rapid rise of industry in the western Gulf states—Texas and Louisiana—has been most remarkable. Several factors have contributed:

(*a*) The great mineral wealth in the form of oil, natural gas, sulphur, and salt;

(*b*) The nearness to the Gulf Coast and to the Intracoastal Waterway;

(*c*) The rapid rise in the standard of living which has resulted from the development of the natural resources.

The rich oilfield has led to many refining and chemical industries including the manufacture of synthetic rubber. Salt and sulphur are useful raw materials; oil and natural gas provide power. Most of these industries are to be found in or near ports on the coast, or connected to the coast by canal. Oil pipelines fan out inland; the Intracoastal Waterway is used for coastwise transport of crude and refined oil. The Gulf ports are well situated to deal with trade with the West Indies and South America in mineral ores, bananas, coffee, and sugar. They export raw cotton.

TOWNS IN THE COTTON BELT AND IN THE SUB-TROPICAL BELT OF THE GULF COAST.—*Memphis* and *Vicksburg* are river ports which ship cotton down the Mississippi. They are connected by a railway which passes north-south along the valley. *Dallas* and *Fort Worth* manufacture textiles and aircraft respectively.

New Orleans (628,000) is the chief port on the Mississippi delta, situated about 100 miles from the Gulf. It is connected by rail and river with the northern part of the lowlands. Before the east-west systems of railways linked the Mississippi Basin to the east coast, New Orleans was the chief outlet for the Central Lowlands. It is still an important river port and sea port and a centre for coastal traffic along the Intracoastal Waterway (Fig. 39). A ship canal connects New Orleans to the sea, avoiding the Mississippi delta. The port is a leading cotton market and exports cotton, petroleum, and food products. It imports crude oil, cane sugar, sisal (Yucatan), coffee, bananas, and Chilean nitrates. New Orleans has large oil refineries and is an important shipbuilding centre.

Houston (940,000) has replaced New Orleans as the Gulf's chief port. It is now the main cotton port and the second port of the U.S.A. It is connected with *Galveston* (68,000) on the Gulf by a ship canal fifty miles long. Houston is an industrial centre with a large chemical industry based on local supplies of oil,

sulphur, salt, and natural gas. Synthetic rubber is one of its products. Industries also include oil refining, sugar and rice milling, and shipbuilding. Galveston and Houston provide outlets for Texan oil and sulphur, and also trade with Mexico and the West Indies.

Beaumont and *Lake Charles* are ports linked to the Gulf by ship canals. *Port Arthur* and *Corpus Christi* are also important ports and industrial centres.

Mobile (203,000) and *Pensacola* are cotton ports east of the Mississippi delta. They form outlets for the industrial area of the Southern Appalachians with which they are linked by rail and canal. Mobile uses iron and steel from the Birmingham area to build ships. It imports manganese, iron, bauxite, rubber, and nitrates from South America. Pensacola has a naval shipyard.

Birmingham (345,000) is the centre of the industrial area of the Alabama coalfield and has a large steel industry which has developed because iron ore, coal, and limestone occur in the same locality near to the city. It has textile mills for making rayon and nylon fabrics, and makes rubber tyres.

Chattanooga (130,000), in the Tennessee Valley, is a rising town important for its textile manufactures, particularly hosiery. It has benefited greatly from the T.V.A. development (p. 104).

Atlanta (488,000), the capital of Georgia, is a rapidly growing industrial city at the southern end of the Appalachians—a great centre for road and rail transport. Cotton mills predominate. There are nearby supplies of coal for power. It has a large plant making *Coca-Cola.*

THE HIGH PLAINS

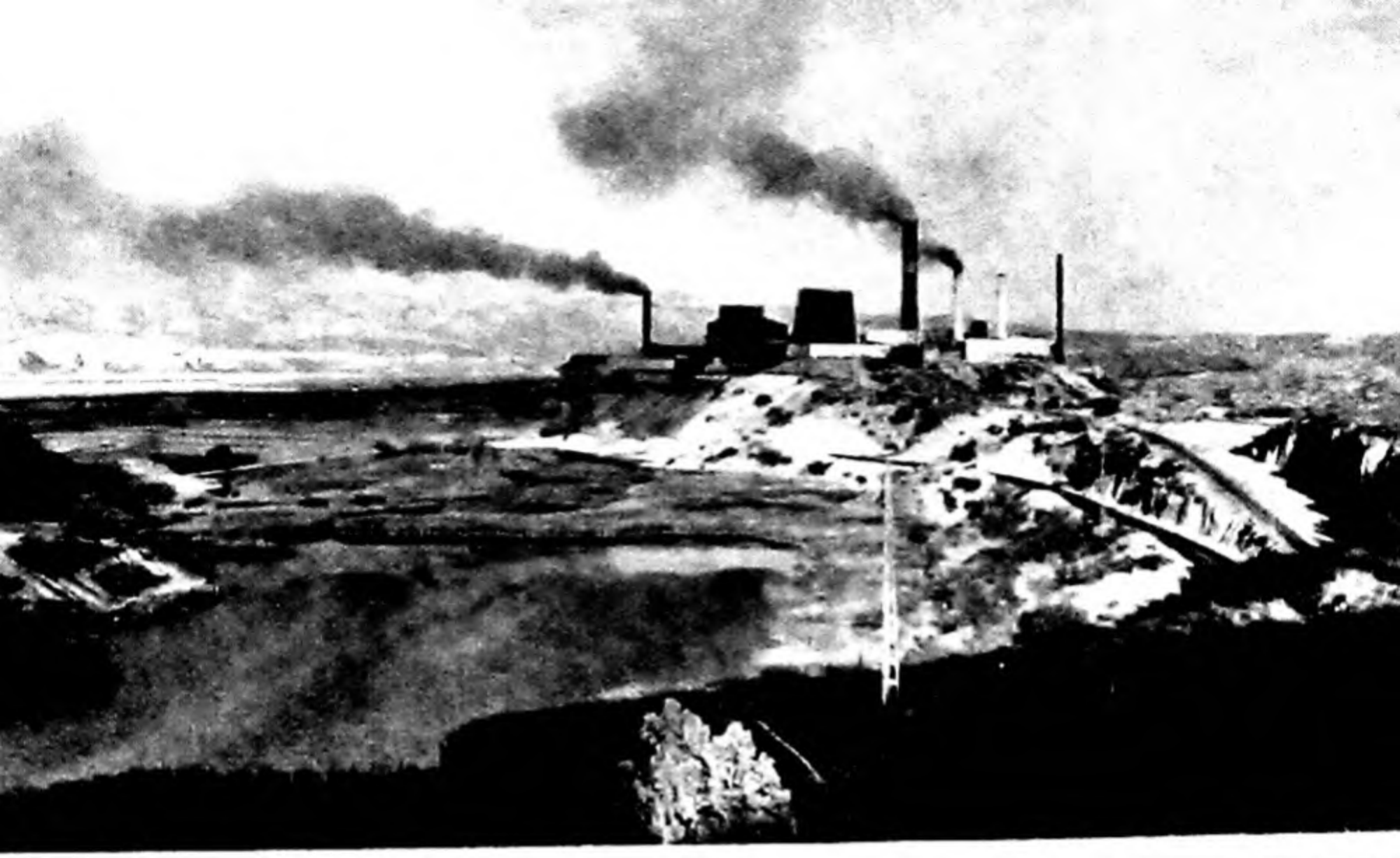
Most of the High Plains are more than 3,000 ft above sea-level. They form rolling grassland country, almost treeless except in the water courses. The surface is sometimes broken by the deep valleys of rivers which drain to the Mississippi.

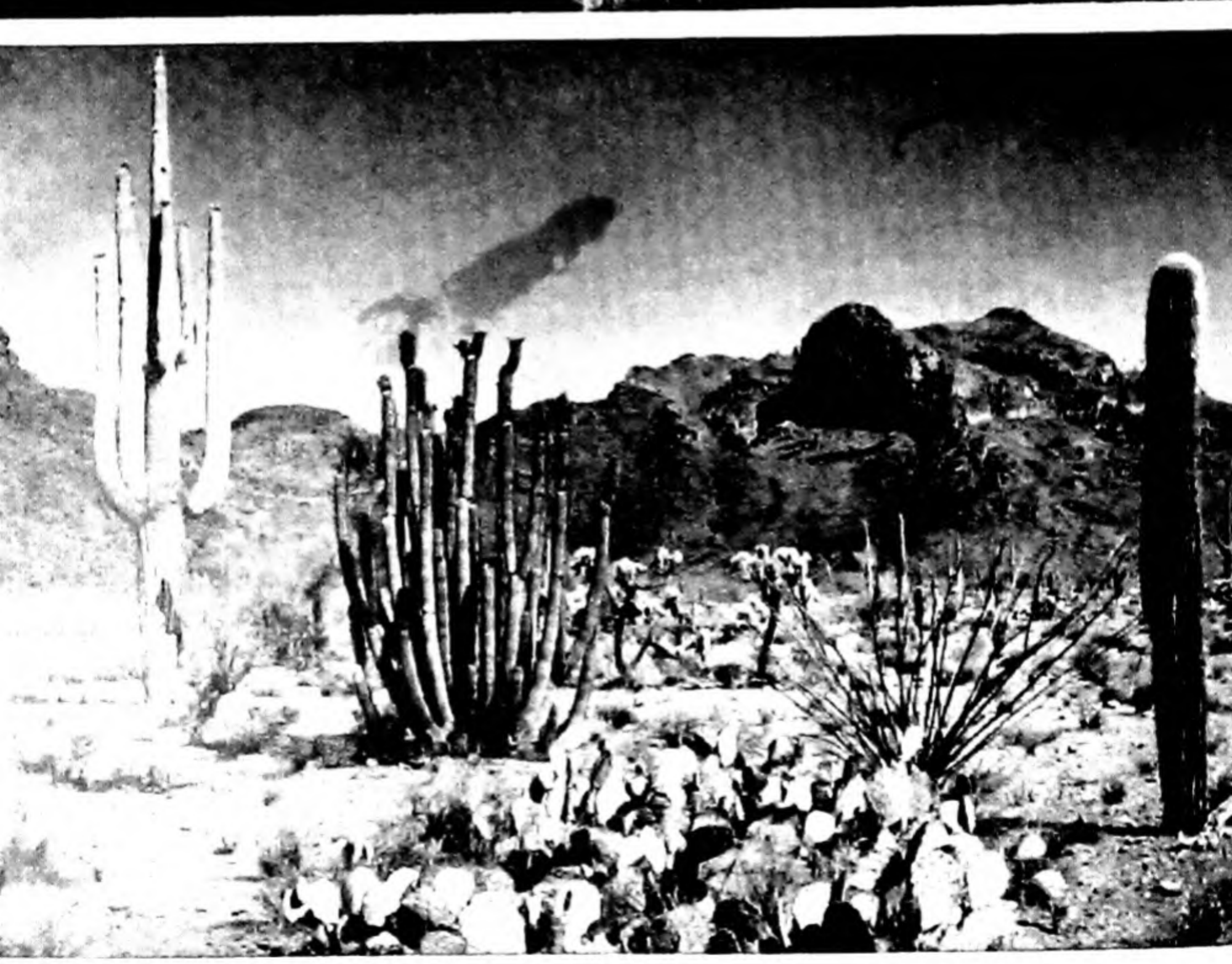
Climatic Factors

The average rainfall of less than 20 in. is generally too small for agriculture. Not only is the average rainfall small but in some years it is much below average. Much of it comes during the summer months in heavy thunderstorms which may do much harm.

Above: Cotton-picking – a slow tedious job. A good deal is now picked by machine. *(United States Information Service.)*

Below: A Montana cattle range. *(United States Information Service.)*





Above: Copper mine and smelter near Miami, Arizona. (*United States Information Service.*)

Below: Desert plants in Arizona, near the Mexican border. (*United States Information Service.*)

Winter temperatures are low, especially in the north, where the January temperature is below 0° C. (*32° F.*). Summer temperatures are high.

Occupations

There are two main occupations:—(*a*) Cattle and sheep rearing. (*b*) Agriculture, aided by irrigation and dry farming.

(*a*) CATTLE AND SHEEP REARING.—Since the area is a natural grassland cattle and sheep ranching have become important (*see* plate facing p. 128). Until the middle of the last century herds of wild buffalo roamed over these plains, hunted by Indians. The introduction of firearms so reduced their number that they were in danger of extinction and are now protected in the National Parks.

Cattle are more numerous in the wetter eastern part of the plains. The poorer the pasture the larger the area needed to feed one animal so that the farms need to be very large, often over 1,000 acres. In some areas the crop rotation is associated with grass on which the cattle may graze; their presence improves the pastures in preparation for the following crop. In this way cattle rearing is becoming more important in the western Wheat Belt. Dairying and the fattening of cattle for meat are both important. The cattle are eventually sent to market centres such as Kansas or Omaha, where some are bought by farmers from the Maize Belt (p. 117) who fatten them on corn and then sell them to be turned into meat products. Cattle, sheep, and goats are also reared on the high plains of Texas. This state takes first place in the beef and wool production of the U.S.A.

Where irrigation is possible the cattle farmer grows sorghum and alfalfa to feed his stock in the severe winters.

(*b*) AGRICULTURE.—Crops are always liable to fail in the High Plains owing to uncertain rainfall. In the wetter eastern parts, corn, fodder, and wheat are grown. In the drier west irrigation is necessary.

Farmers realise they must safeguard themselves against erratic rainfall and subsequent soil erosion. Mixed farming is practised with livestock and a variety of crops which need different amounts of moisture. Most farms have enough water to irrigate land to grow fodder for animals. Land which is not irrigated is "dry farmed". This means that the farmer tries to preserve two years'

rainfall in the soil by cropping only in alternate years. While the land is fallow the surface must not be allowed to bake hard in the summer heat. If a crust is allowed to form the moisture in the soil is drawn to the surface and evaporates. So the surface is kept open by harrowing or by leaving stubble from a previous crop in the ground. A typical rotation would be to sow winter wheat in October, harvest it the following spring, and leave the stubble standing for a year, using special machines to get rid of moisture-loving weeds. Then a crop of sorghum is sown and harvested in the following October, the stubble again being left for a year.

Schemes originally undertaken to provide water for mining at the foot of the Rockies are now used to provide water for agriculture as well. Large areas in the valleys of the North and South Platte and Arkansas are so irrigated. Sugar-beet is an important crop and cotton is grown on a large scale in Arkansas.

In Wyoming and Montana sugar-beet, potatoes, wheat, corn, and fodder crops are produced by dry farming methods.

In irrigated areas near the Rio Grande in Texas, citrus fruits are produced in considerable quantities. Texas is now the foremost cotton producing state in the U.S.A.

Soil Erosion.—As in the Maize and Cotton Belts, soil erosion has done much damage in the High Plains, particularly in the "Dust Bowl" of Kansas, Oklahoma, and Texas. When the natural covering of grass was removed for purposes of cultivation, areas were sometimes left fallow with no cover of vegetation. These areas were baked to dry dust in summer and frozen in winter. Years of drought produced more and more dust which the wind swept away to other areas, thus removing the soil. Farmers left the area, so leaving more ground exposed to the wind and heavy thunder rains which helped to remove more fertile soil. Measures are now being taken to prevent further damage. Large areas are being sown with drought-resisting grasses which will support sheep and cattle and provide soil cover. Where the land is cultivated farmers sow crops in strips and plough parallel to the contour lines (*see* plate facing p. 96).

Missouri Development Schemes.—The Missouri Basin embraces a vast area, partly in the High Plains and partly in the agricultural lowlands. The upper part of its basin is an area of erratic rainfall with an annual total of less than 15 in. The chief problem is to

provide water for irrigation. The lower part of its basin has an annual rainfall of about 40 in. but is liable, in summer, to rainstorms of exceptional violence which cause flooding. Owing to the floods and the large amount of silt the Missouri carries the river is difficult to navigate. Efforts are now being made to control the floods by building dams and levees, at the same time improving navigation. The work which has the backing of the U.S. Government is being carried out on the lines of the Tennessee Valley Authority Scheme (p. 104). Dams have also been constructed to

Fig. 40. IRRIGATION IN THE MISSOURI BASIN.

hold back water for irrigation in the upper basin and, in some places, to provide hydro-electricity. At Sioux Falls on the Big Sioux tributary of the Missouri, some miles north of Sioux City, is a generating plant using atomic power, the first of its kind to be built in the U.S.A.

(*c*) MINERALS.—Poor coals such as lignite underlie many parts of the High Plains. They are worked near Denver and in Wyoming, Montana, and North Dakota. These coals are similar to the Prairie coals of Alberta. They contain much less carbon than the Appalachian coals and are farther away from the main industrial areas,

so that it may be a long time before they are mined to any great extent. Oil and uranium are obtained in Wyoming.

Towns

Denver (494,000) is the most important town of the High Plains. It lies in an area of irrigated land at the foot of the Rockies and is a mining and agricultural centre with stockyards and good road and rail connections both westward across the mountains and eastward to the plains. It is the most important financial and business centre of the western mountain states.

CHAPTER XVI

THE MOUNTAIN STATES

Physical Features

Between the "Great Plains" and the Pacific Coast is a vast area of mountain ranges, plateaux, and intermont basins which, at their widest, occupy about one-third of the breadth of the United States. The eastern boundary is formed by the lofty ranges of the Rocky Mountains, which form a barrier broken by few passes. The plains of Wyoming occupy one such break in the mountains formerly used by the settlers as the Oregon Trail, now followed by a trans-continental railway which turns southward through Salt Lake City to San Francisco. In the southern part of the barrier, the Santa Fé Trail, now used by another trans-continental railway to Southern California, follows a break between the Rockies and the plateau country of New Mexico.

Beyond the Rockies lies a complicated area of tilted mountain blocks which form plateaux and escarpments enclosing basins of inland drainage. Some such basins, as, for example, that of the Salt Lake, are very large and contain stretches of saline waters. Other basins, which once contained lakes, are now dry and the old lake beds yield important deposits of salt and borax.

Three large rivers rise in this area and reach the sea, namely:— (*a*) Snake River, (*b*) Colorado River, (*c*) Rio Grande (Fig. 41, p. 134).

Climate

The whole area except the high mountains is characterised by deficient rainfall. In general the rainfall decreases from north to south and from east to west. It is especially low in the rain-shadow areas of the enclosed basins where the annual average is less than 5 in. Temperature varies with altitude, but everywhere there are big daily ranges, and frost is common at night, even in the valleys. Day temperatures may be very high in summer. In Death Valley (246 ft below sea-level) summer day temperatures of 60° C. (*140° F.*) have been recorded. The air on the plateaux is remarkably exhilarating.

Natural Vegetation

The higher slopes of the mountains remain snow-covered throughout the year. Pine forests clothe the upper slopes where

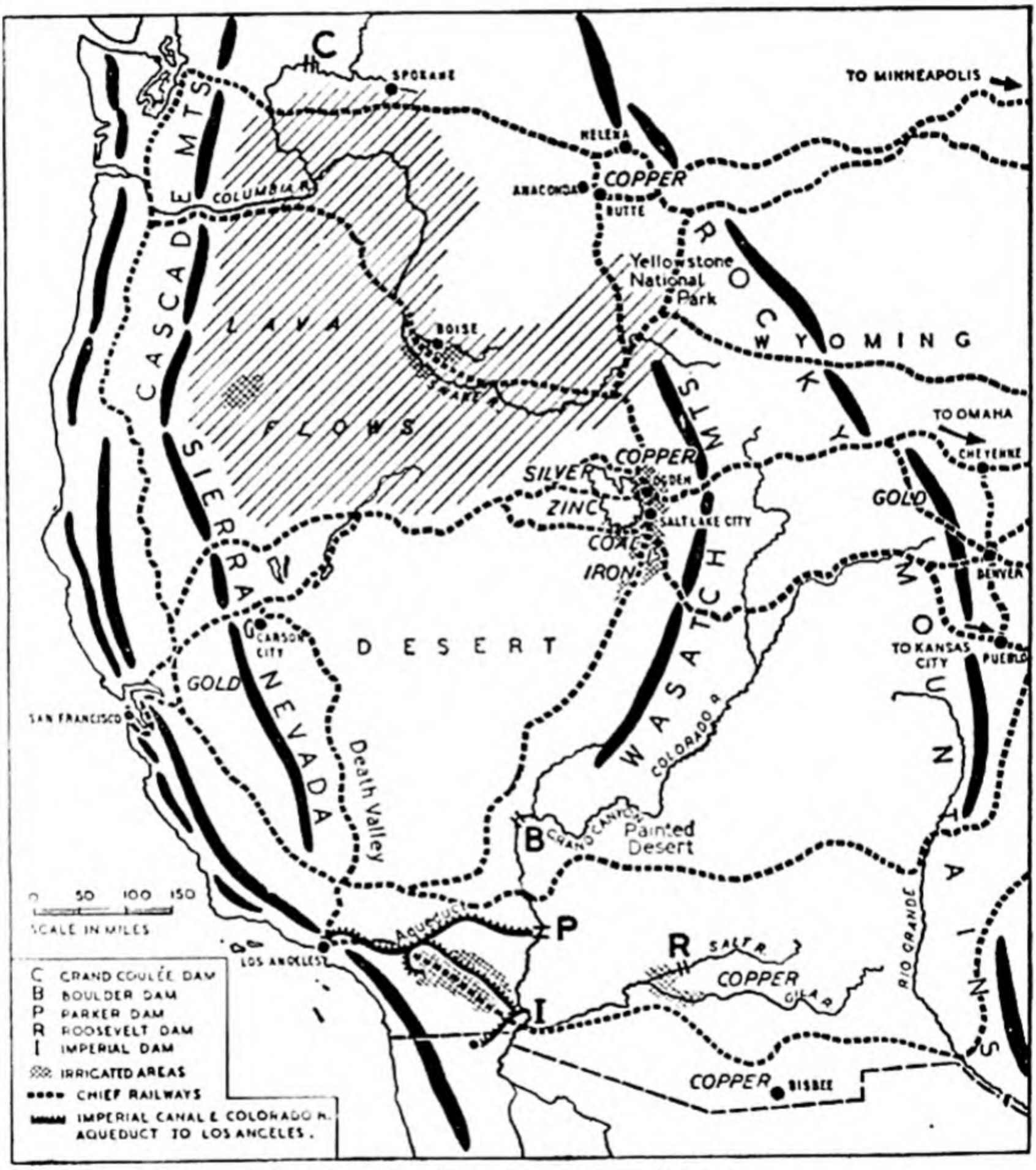


Fig. 41. THE MOUNTAIN STATES.

rainfall is sufficient. The piñon tree of New Mexico supplies nuts which are gathered and sold by the Indians. As drought increases on the lower slopes scrub and poor pastures are the only vegetation on which sheep and cattle are pastured. As much as 7,000-8,000

acres may be required for one ranch. The lowest areas are semi-desert or sandy and gravelly wastes devoid of vegetation. In the north, sage bush and bunch grass is the typical vegetation, while cacti and yuccas are characteristic of the south.

Scenery

Unusual scenery characterises most of the area and has led the U.S.A. to preserve many fine areas in National Parks and Monuments. Names like Rainbow Bridge, Organ Pipe Cactus, Petrified Forest, Craters of the Moon, Wind Cave, and Lava Beds give some idea of the diversity of National Monuments, while Yellowstone, Yosemite, Grand Canyon, Bryce Canyon, are but a few of the many National Parks.

NORTHERN AREA.—In fairly recent geologic times there has been volcanic activity in the northern area. Vast sheets of lava spread over the Snake and Columbia Basin. The geysers and "smoke" holes in the Yellowstone Park are visited annually by many tourists.

SOUTHERN AREA.—Desert scenery is typical of this area (*see* plate facing p. 129). Perhaps the most beautiful scenic effects of the desert are the vivid colouring of the rocks. Since the air is so dry, the original colours of the rocks are not destroyed by chemical changes, and pink, purple, and white cliffs delight the eye in the "Painted Desert" of Arizona. Not only is the rock colouring vivid, but the clear air at sunrise and sunset paints the bare mountains in shades of violet and amethyst. J. B. Priestley in *Midnight on the Desert* writes of Arizona as follows:— "Seen close at hand, there is nothing very attractive about these hills, so prickly with cactus or the savage rocky peaks behind them. . . . The vast distances do the trick. The air seems to act like a powerful stereoscopic lens. Everything far away—and you see scores of miles—is magically moulded and coloured. The mountains, solidly three dimensional ranges and peaks, are an exquisite blue in the daytime and then turn amethyst at sunset . . . everywhere towards the far horizon, rise chunks of colour unbelievably sumptuous. . . . At sunset the land throws up pink summits and saw-toothed ridges of amethyst and there are miracles of fire in the sky. Night uncovers 2 million more stars than you have ever seen before."

Erosion plays a big part in such an arid land. Vast sheets of gravel and sand derived from the bare crumbling escarpments spread over the floors of the basins. Dust storms whirl along the sand to polish and scratch the bare rocks, carving out natural bridges and curious shapes such as those to be seen in Monument Valley.

River erosion is also very active in the Colorado Basin. For 125 miles the river winds through the magnificent Grand Canyon which is more than a mile deep. It takes three hours on mule-back, over zigzag tracks, to reach the bottom. The horizontally bedded rocks and the dry climate have enabled the Colorado and its tributaries to cut deep valleys, for there is little weathering of the sides in so dry a climate (*see* plate facing p. 97). A slow rising of the land relative to sea-level has aided the process of downcutting by the rivers and produced the deep canyon. These deep gorges leave isolated parts of the plateau to form fantastic mesas.

Economic Resources

Mining has been the chief activity since the Gold Rush of 1849. Many of the earlier mines are worked out and only large-scale lode mining is profitable. The minerals occur in rocks which have been intruded by hot solutions and gases from the interior of the earth. These penetrated fissures and cavities in the rocks and minerals were deposited in veins or lodes. Different kinds of minerals, such as silver, lead, and zinc, may occur in the same lode. The chief mining areas are as follows:—

(1) *Montana* and *Idaho.*—Very rich copper and zinc ores are worked near Butte. The Montana district, once the leading copper producer of the U.S.A., has now been surpassed by Utah and Arizona. Silver, lead, and zinc are also mined. There are large smelting works at Anaconda, where electricity is generated. The ore concentrates are sent to Puget Sound, Washington, to be refined.

(2) *Colorado.*—Colorado is the second gold-producing state of the U.S.A., surpassed only by California. Zinc and lead are also mined near Leadville.

(3) *Utah.*—Copper is mined near Salt Lake, as well as lead, silver, gold, and zinc. A small local coalfield is being developed to provide power for the smelting plants. There are also reserves of iron ore in Iron County, but the difficulty of transport to the more industrial parts of eastern U.S.A. has retarded the development

of iron and coal mining in Utah. In recent years Utah has become a considerable producer of steel and is also the leading producer of uranium in the U.S.A.

(4) *Nevada.*—Copper, silver, and gold are mined in this state.

(5) *Arizona.*—Large quantities of copper are obtained from the Salt River area and from a huge open-pit working near Bisbee, giving Arizona the first position in copper production in the U.S.A. with more than half the country's output (*see* plate facing p. 129).

Coal is used in Arizona to generate electricity and high-grade iron ore supplies a steel plant.

Many of the ores mined in these western states are sent to Denver, on the east side of the Rockies, and to Puget Sound (Fig. 42) for smelting. Phosphates are known to exist in Colorado, Wyoming, Idaho, and Utah, but are little worked, except in Idaho.

America's newest oilfield lies at "Four Corners" where the four states of Utah, Colorado, Arizona, and New Mexico meet. A pipeline carries the crude oil across the mountains to Los Angeles in California.

FARMING.—Sheep and cattle graze on the poor pasture and scrub of the mountain slopes, but a large acreage is necessary for a few animals.

Agriculture is possible in the wetter parts of the Columbia valley by using dry farming methods. Elsewhere irrigation is necessary, and crops are thus limited to the river valleys. The chief agricultural areas of the north are (*a*) Snake Valley; (*b*) Nevada (Carson City); (*c*) Utah.

In these areas the chief cash crop is sugar-beet. Beans, wheat, and vegetables are produced for local needs and alfalfa is grown as winter feed for the cattle and sheep which graze on the hills in summer. Utah provides a striking example of what may be done agriculturally with very unpromising land when science and initiative are used to tackle the problem. Whenever a stream emerges from the Wasatch Mountains the resultant oasis is cultivated. Water is even brought from the Upper Colorado Basin by tunnel through the mountains. Much money has been spent on irrigation schemes both by the inhabitants and by the U.S.A. Government—as, for example, in Strawberry Valley and near Salt Lake City, where peaches, apricots, and citrus fruits are cultivated.

In the south, the chief agricultural areas are (*a*) Gila and Salt River area; (*b*) Imperial Valley and Lower Colorado Valley. In these districts the hot sunny summers ripen sub-tropical fruits. Peaches, apricots, olives, dates, and vegetables are grown and long staple cotton is an important cash crop in Arizona. Fodder crops are also grown. The Roosevelt Dam on the Salt River provides water for the area round Phoenix. Hoover Dam, on the Lower Colorado, provides water to irrigate an area in Arizona half the size of Wales. A canal takes water from the Lower Colorado to irrigate the Imperial Valley of Southern California.

Two canals bring water from the Imperial Dam on the Colorado River to Yuma in Arizona to irrigate a large area for growing fruit and vegetables.

FORESTRY.—Arizona has considerable timber resources which support a newsprint and paper industry.

TOWNS.—The few towns of these western states chiefly originated as mining towns or route centres. They have since developed, due to railways passing through and the nearness of irrigated lands.

Salt Lake City (190,000) is one of the largest and most important towns in Utah. It is situated near the southern end of the Great Salt Lake at the foot of the Wasatch Range. It is the centre of a rich, irrigated area which produces beet for the sugar factories of the town and vegetables for canning factories. Cattle provide meat for the meat-packing industry. There is also a large metal industry fed by local ores. Main trans-continental railways and air-lines link the town with the rest of the U.S.A.

Other towns include:—

Boise (Idaho). Agricultural and railway centre.

Carson City (Nevada). Irrigated area; railway.

Ogden (Utah). Mining and agricultural centre; railway.

Phoenix (552,000), in Arizona, has an important aluminium plant. It is the centre for the irrigated parts of the Salt River Valley which produces crops of citrus fruit, dates, olives in summer and large quantities of lettuce and celery in winter.

Yuma (Arizona). Irrigated area; railway.

Tucson (227,000), in Arizona, is a cattle and cotton centre with aircraft factories.

Communications

A modern map of the U.S.A. will show a surprising number of railways. Five trans-continental lines link the Pacific States with the eastern part of the U.S.A. Only the most important railways are shown on the map (Fig. 47, p. 157). There are also many miles of good motor roads. Not only do they help to develop the mineral and agricultural resources of the area, but they bring large numbers of tourists to visit the National Parks and Monuments.

Indian Reservations

Areas are set aside as Reservations for Indian tribes, who keep sheep and cattle on the sparse vegetation and grow a small amount of grain where water is available. Many wear native costumes, and make small souvenirs which they sell to tourists who visit them. The Western Mountain States and the Pacific States have many such Reservations. As a whole, the Indians of this area play little part in the economic or political life of the U.S.A.

CHAPTER XVII

THE PACIFIC STATES

The Pacific States of the U.S.A. comprise California, Oregon, and Washington. Alaska is dealt with in Chapter XVIII.

Physical Features

The whole western seaboard of North America from Alaska to Mexico is cut off from the eastern states by high mountain ranges which run parallel to the coast. Behind the coastal mountains are longitudinal valleys of which the Willamette-Cowlitz valleys of Oregon and Washington and the Central Valley of California, drained by the Sacramento and San Joaquin, are the most important. Further south the Imperial Valley and the Gulf of California mark the position of another such valley which has been partially submerged by the sea. There are very few openings through the coastal mountains, and where gaps occur important ports have developed, such as:—

(*a*) Seattle and Tacoma on Puget Sound,

(*b*) Portland on the Lower Columbia River,

(*c*) San Francisco on the Golden Gate.

On their eastern sides the valleys are flanked by high mountain ranges, the Cascades in Oregon and Washington and the Sierra Nevada in California. A line of earthquake activity passes down the Californian coast.

Pacific Relations

Names like San Francisco show that California first belonged to Spain and Mexico. Until the early part of the nineteenth century the Pacific coast was isolated from the eastern states by the mountain barrier. The discovery of gold in 1849 led to the opening up of California and the first trans-continental railway followed in 1869. During the latter half of the century large numbers Chinese and Japanese emigrated to the Pacific States, particularly

to California. The numbers of Chinese have not varied much since about 1860, but there was an increasing flow of Japanese immigrants until 10,000 per annum was reached in 1919. The Americans were alarmed at the large number of Japanese who were settling in

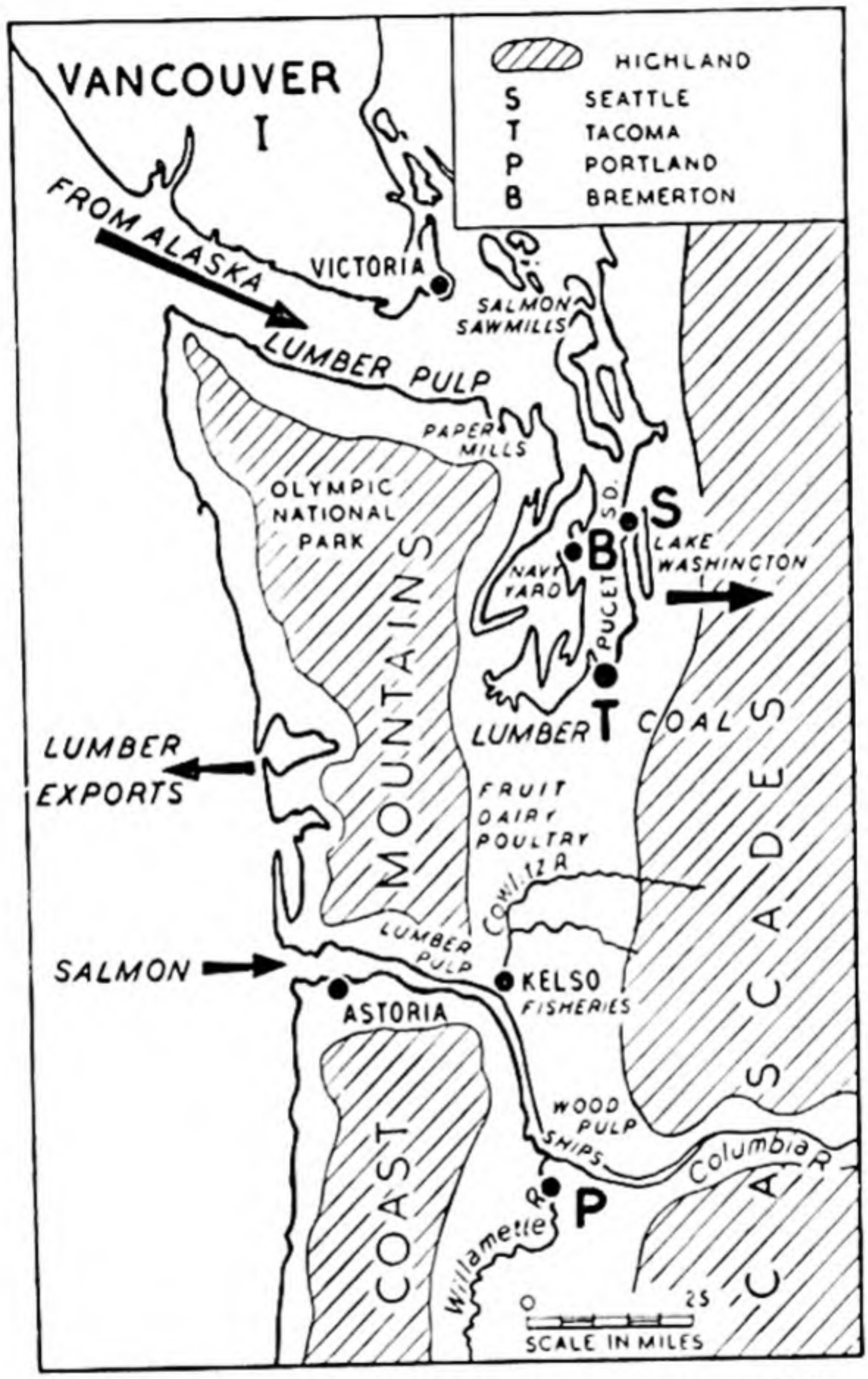


Fig. 42. THE NORTH-WEST PORTS OF THE U.S.A.

California and this led to various agreements to restrict their numbers and finally to the Immigration Act of 1924 which virtually brought Japanese immigration to an end. Japan was annoyed at this discrimination against her people and there is little doubt that

the ill-feeling thus engendered was an important factor in causing war between the two countries in 1941.

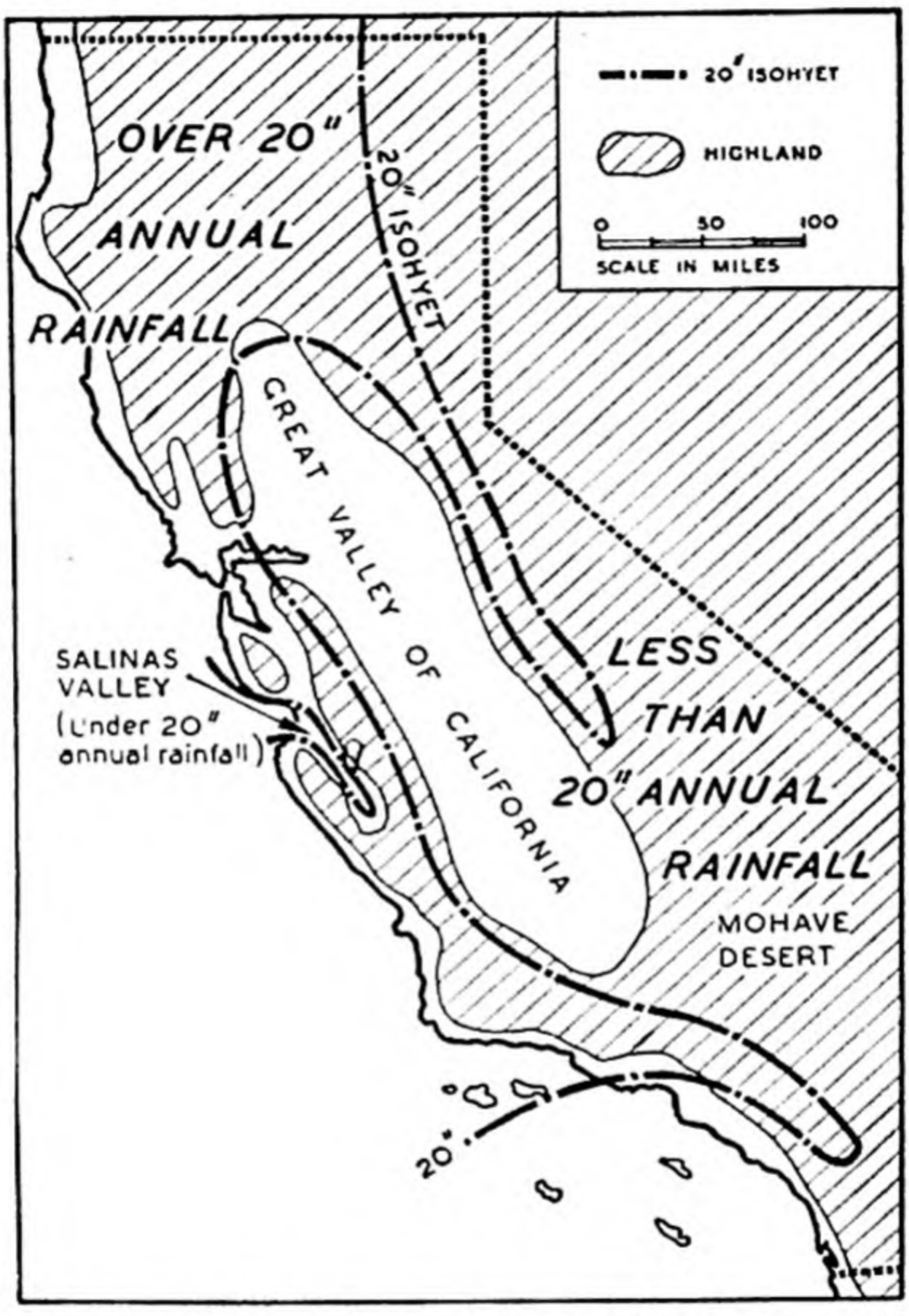


Fig. 43. CALIFORNIA. MAP SHOWING HOW RELIEF AFFECTS RAINFALL.

Climate

The prevailing winds and ocean currents which affect the climate of the Pacific States have been fully described in Chapter III. The coasts of Washington, Oregon, and California, north of latitude 40° N., have a West European type of climate with no dry season. This climate is similar to that of the coastal lands of British

Columbia, but with a higher average annual temperature. Between latitude 40° N. and latitude 35° N. the Californian coast and valley have a Mediterranean climate with winter rains. South of latitude 35° N. the climate becomes more arid and desert conditions prevail in north-west Mexico.

The rainfall decreases in two directions:—

(1) North to south: (2) West to east (Fig 44).

The western windward slopes of the mountains have most rain, while the longitudinal valleys are marked rain shadow areas. The

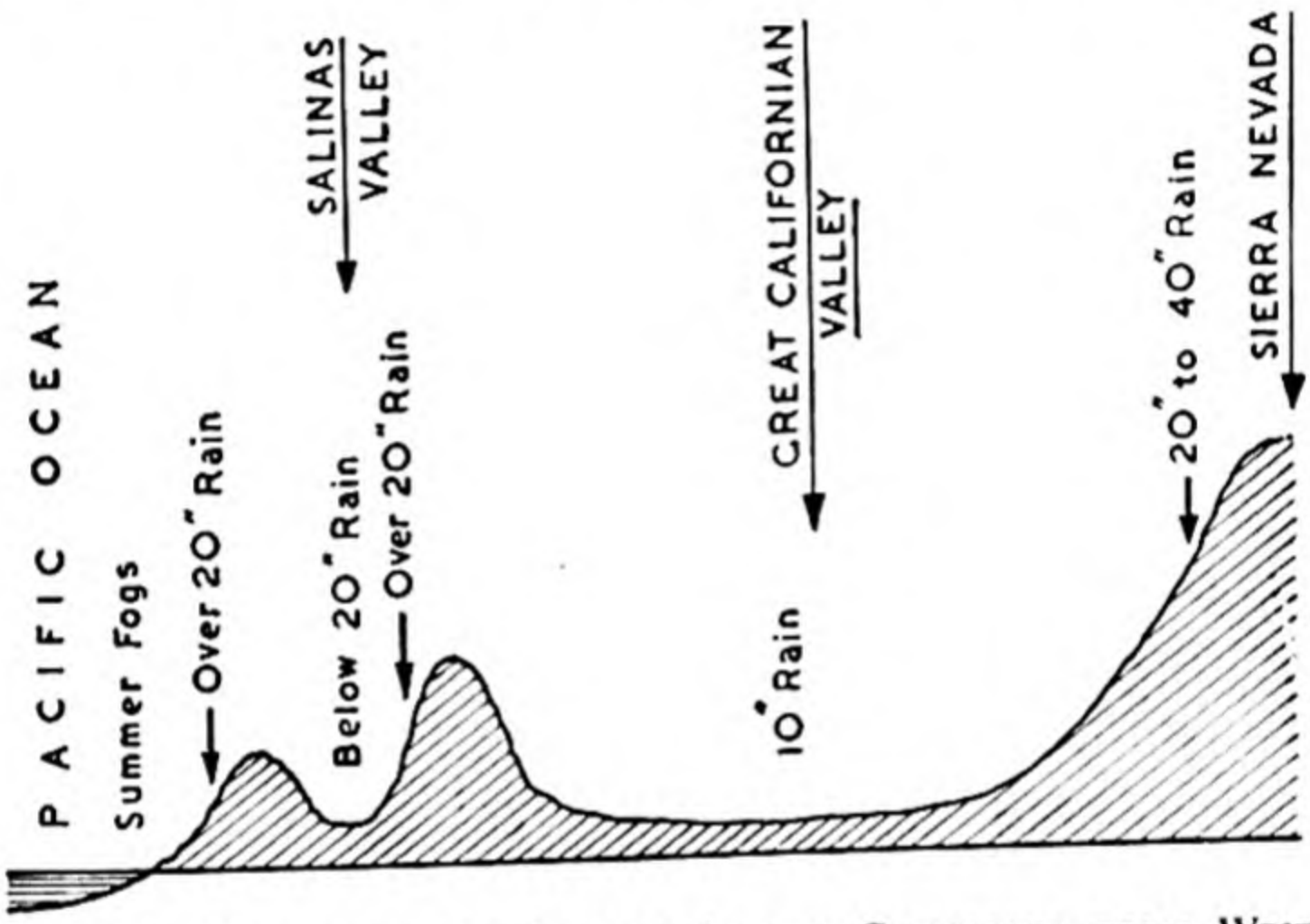


Fig. 44. DIAGRAMMATIC SECTION ACROSS CALIFORNIA FROM WEST TO EAST TO SHOW THE RELATION BETWEEN RELIEF AND RAINFALL.

Sierra Nevada are high enough to have a rainfall which varies from over 40 in. in the north to over 20 in. in the south. This water causes many streams to flow to the Central Valley of California, where they are used for irrigation.

The annual range of temperature is much greater in the valleys than on the coast, the difference between the two being most marked in summer.

This difference in summer temperature is partly due to the interception of the sea influence by the coastal mountains and also to the presence of a cool current off the Californian coast which causes summer fogs. Winds similar to the Chinook (or Föhn)

bring dry, heated air down the Central Valley in summer and thus increase its temperature and aridity.

	Summer Maximum Average Temp.	Winter Minimum Average Temp.
San Francisco	15° C. (59° F.)	9·5° C. (49° F.)
Sacramento	22·5° C. (72° F.)	7° C. (45° F.)

Vegetation

Vegetation is largely dependent on rainfall and altitude. On the coast ranges and the wetter slopes of the Cascades and Sierra Nevada, coniferous forests are common. These include the giant redwoods of California and large stands of Douglas firs and spruce. Coastal summer fogs which increase the relative humidity allow forest growth to extend along the coast ranges as far south as San Francisco. South of this point the rainfall is only enough to support dwarf gnarled evergreens known as Chaparral. The dry inland valleys originally had scrub vegetation. Irrigation has made them prosperous agricultural areas, with numerous fruit trees. Drought-resisting eucalyptus trees are used as wind screens.

Washington and Oregon—Industries

Timber Industry.—Washington and Oregon are important for the production of timber—especially of Douglas fir, redwood, cedar, and spruce. Many places round Puget Sound export constructional timber, much of which reaches eastern U.S.A. and Europe via the Panama Canal.

Fishing.—Many salmon are caught in the Lower Columbia River. Large canneries at Astoria preserve part of the catch and the remainder is exported fresh.

Agriculture.—The lower lands of the Washington and Oregon valleys are covered with fertile soil derived from the breaking-up of lava (Chapter XVI). The Columbia River and some of its tributaries provided water for irrigation and hydro-electricity. The largest schemes include the Bonneville Dam about forty miles above Portland, and the Grand Coulée Dam west of Spokane (Fig. 41).

The chief crops are temperate fruits (apples, pears), spring and winter wheats, and fodder crops such as alfalfa which are used in a dairying industry. Fruit is canned near Puget Sound.

Above: The most extensive irrigation scheme in California is that of the Central Valley, from the Shasta dam, 500 miles to the north. Into this dam flows the Sacramento River, much of whose water is derived from melting snow on the mountains still further north. (*United States Information Service.*)

Below: An irrigated field in the Imperial Valley, California. The paper caps are protecting young melon plants. (*United States Information Service.*)

Above: Oil wells in California. There are nearly 30,000 oil wells in California, producing about 50 million tons a year, more than any other state except Texas. (*United States Information Service.*)

Below: The Oakland Bay Bridge, San Francisco. (*United States Information Service.*)

MINERALS.—The only mineral of importance in the North Pacific States is coal, which is mined in Washington. Its good coking properties make it useful in the iron and steel and lead-smelting industries of Seattle and Tacoma.

Washington and Oregon—Towns

Seattle (557,000), the most important town and port, is situated on the large drowned inlet of Puget Sound. Its industries include timber, aircraft, iron and steel, shipbuilding, and fruit canning. Seattle is also a centre for supplies from Alaska such as gold, copper, timber, and salmon. It is the terminus of a trans-continental railway via Helena to Chicago and the eastern states. Seattle has considerable trade with Asia and the islands of the Pacific.

Tacoma (152,000) has similar industries to Seattle and refines lead sent by rail from Idaho mines.

Portland (372,000) stands on an important gap in the Coast Range where the Columbia River breaks through to the sea. It can be reached by ocean-going ships and has important shipbuilding industries. It commands both the fertile Willamette and Cowlitz valleys and also the Upper Columbia Valley round *Grand Coulée* and *Spokane* (227,000). Portland competes with Seattle and Tacoma for trade with Asia. Salmon caught in the Columbia River are canned at *Astoria* near the mouth of the river.

California—Industries

The population of California has doubled in the last twenty years and it is now the most populous state with 20 million people —a population larger than that of New York State. California is extremely prosperous with a high standard of living.

AGRICULTURE.—Except in the higher and northern coastal areas, much of California is too dry for successful cultivation without irrigation (*see* plate facing p. 144). Originally wheat growing and cattle rearing were the chief types of farming. Now California contains over 20 per cent. of the irrigated land in the U.S.A.

California has very ambitious schemes for carrying water from the wetter northern part of the Central Valley to the dry southern area of the San Joaquin Valley (*see* plate facing p. 144). Already the Upper Sacramento River has been harnessed by the Shasto and the Keswick dams, where hydro-electric power is generated. From

these the water is carried down the Sacramento to the San Joaquin delta. It is then raised 200 ft to the Mendota canal on the western side of the San Joaquin River by means of a large pumping plant which can raise two million gallons a minute. The water flows 200 miles to a pool near Fresno and feeds a canal stretching a further 120 miles to Bakersfield. In this way water for irrigation is brought to a large area in the driest part of the San Joaquin Valley. In 1960 California embarked on another gigantic long-term project to bring the surplus water from the rainy north to be used in the dry south. It involves a 760-mile aqueduct and the building of 200 dams. Los Angeles expects to receive water from this scheme in 1971.

The hot, sunny summers have made fruit growing very important in California. Grapes, peaches, and apricots are grown in most areas, especially in the Sacramento and San Joaquin valleys, where there are flourishing vineyards. Plums are characteristic of the Santa Clara Valley and are grown for drying (prunes). Oranges and lemons, which require hotter conditions, are produced on the foot-hills which flank the eastern part of the San Joaquin Valley, avoiding lower ground because of danger from frost. Irrigation is necessary in the drier areas.

Apples are produced in the wetter district of the Monterey Valley near the coast, and in most districts soft fruit and vegetables such as tomatoes, lettuce, and onions are grown. Some of this produce is flown in refrigerated aircraft to the cities of the Atlantic States.

The summer drought of a Mediterranean climate provides good conditions for fruit drying. Most of the dried fruit of U.S.A. such as raisins, currants, prunes, and peaches, comes from California. Good rail and air communication with the eastern states allows a quick export of fresh fruit and early vegetables. Canning of fruit and vegetables is also important. In the wetter north, cattle are reared in the lowlands in winter and sent up to the mountain pastures in summer in order to free the lowlands for crops of alfalfa for fodder, wheat, and barley. An important dairying industry has grown up in this area. Eggs are also produced on a large scale. The hot summers of the Central Valley and the extensive use of irrigation led to experimental rice growing influenced no doubt by the large numbers of Chinese and Japanese immigrants. The results have been good and although production is relatively small, over one-fifth of the rice grown in the United States comes from

the Lower Sacramento Valley. Where the climate is arid in the extreme south, extensive irrigation, by the Imperial Valley Canal Scheme, has led to the production of fruit, market-garden produce, and cotton. In the southern part of the San Joaquin Valley cotton is grown on a considerable scale; California is only surpassed by Texas as a cotton producer. A further extension of the irrigated area of the Lower Colorado Valley is fed from water held back in the Colorado River by the Hoover Dam (Fig. 41).

MINERALS.—California is the first gold-producing state of the United States and reaches about one-third of the total for the country. It is mined in the Sierra Nevada foot-hills and in the Klamath Mountains.

Oil is obtained from the southern and upper end of the San Joaquin Valley and near Los Angeles. The crude oil is pumped to the coast by pipelines to San Francisco, Monterey, Port Harford, Santa Monica, and Wilmington, where there are refineries. Oil is exported to eastern Asia and to Europe via the Panama Canal; some is used for coastwise shipping using diesel oil and the rest is used for local transport and industry.

LUMBERING.—Timber is obtained from the forests of the north, but is much less important than that of Washington and Oregon.

INDUSTRIES.—Before World War II, the most important industry of California was the processing, packing, and marketing of food. This still goes on but the manufacture of aircraft, cars, and ships is now of greater importance. The Los Angeles area is the most important in the world for the manufacture of aircraft of every kind. Many of the large planes which fly on long-distance commercial air-lines are made here. The testing of machines and the training of pilots is done over the Mojave Desert. Ships are built at San Francisco. Although lacking in coal and iron, steel is made —mainly from scrap iron. This has led to the manufacture of machinery and metal goods. Power for industry is provided by the oilfields in the south of California and by hydro-electricity, a by-product of the vast irrigation and river control projects. The oilfields have led to oil refining and chemical industries.

California—Towns

Sacramento (192,000), situated in the Central Valley, is the state capital, and an important market town and route centre.

San Francisco (743,000) has a magnificent situation south of the Golden Gate, a break in the coast range giving access to the harbour. Train ferries and an eight-mile long bridge connect the various settlements around the shores of the inlet. It is also linked with the eastern states of the United States by three trans-continental railways and regular air services. It is a port with a fine harbour and a very productive hinterland, and exports fruit, canned goods, and oil. It has also an important trade with Asia and the Pacific Isles, and imports tea, silk, sugar, and copra (*see* plate facing p. 145).

Los Angeles (2,500,000) is situated near the south coast some twenty miles from its port of San Pedro and is the centre of one of the largest built-up areas in the world with some 6½ million people. The centre of the city lies some twenty miles from the sea and is surrounded by rapidly growing suburbs linked by modern roads or "speedways". Its clear air and long hours of sunshine led to the development of a large film industry in the Hollywood area. Of recent years, however, industrial development, including steel works, has resulted in liability to bad smoke fogs ("smogs"). Aircraft and motor car industries are very important and it is famous as a centre for nuclear research.

Wilmington, near San Pedro, is a small oil-exporting port with shipbuilding yards.

San Diego (575,000), on the extreme south coast of California, is a naval station with a good harbour and vast airfield, but is handicapped as a port by an unproductive hinterland. It has an important aircraft industry. An important fishing industry is based on San Diego and there is a factory for canning tuna.

CHAPTER XVIII

OUTLYING STATES: ALASKA AND HAWAII

Alaska

Alaska was discovered by the Russian explorer Bering in 1728 but was little exploited except by fur traders. It was purchased from Russia by the United States of America in 1867 for less than one and a half million pounds, and nearly all the land remains state property. The gold rush of 1897-8 brought many prospectors, though few remained. To-day the state of Alaska has a population of 250,000—about one-sixth of them Indians and Eskimos, and the remainder mainly whites, including some army, naval, and air force personnel.

Mountain ranges divide the country into three parts:—

(*a*) *Southern Alaska*—between the south coast and the Alaska Range, including the western extension of the Aleutian Islands.

(*b*) *The Yukon Valley*—between the Alaska Range and the Endicott Range.

(*c*) *Northern Alaska*—between the Endicott Range and the Arctic coastline.

Southern Alaska

Southern Alaska is by far the most important part of the state. The irregular coastline is backed by a continuation of the coast ranges of British Columbia. One range extends westward into the Pacific as the Alaska peninsula and continues, partially submerged, as the Aleutian Islands. The mountains are high and snow covered, and include many active volcanoes. Westerly winds bring an abundant rainfall, and warm Pacific currents make the climate relatively mild for such high latitudes. Although the summers are short they are quite warm, for there are long hours of daylight.

Fishing is the chief occupation of the coastal region. Salmon form the chief source of wealth and over a hundred canneries prepare the fish for export. Herring, halibut, cod fishing, and whaling are also carried on.

The wet slopes of the coastal ranges are clad with hemlock, spruce, and cedar, and there is considerable lumbering activity. The United States has almost exhausted its supplies of soft wood and now looks increasingly to Alaska for some of its wood-pulp. Enough timber grows within five miles of the coast to supply annually a quarter of the U.S. newsprint demands without depleting reserves. Much pulverised timber is exported to Japan for making synthetic

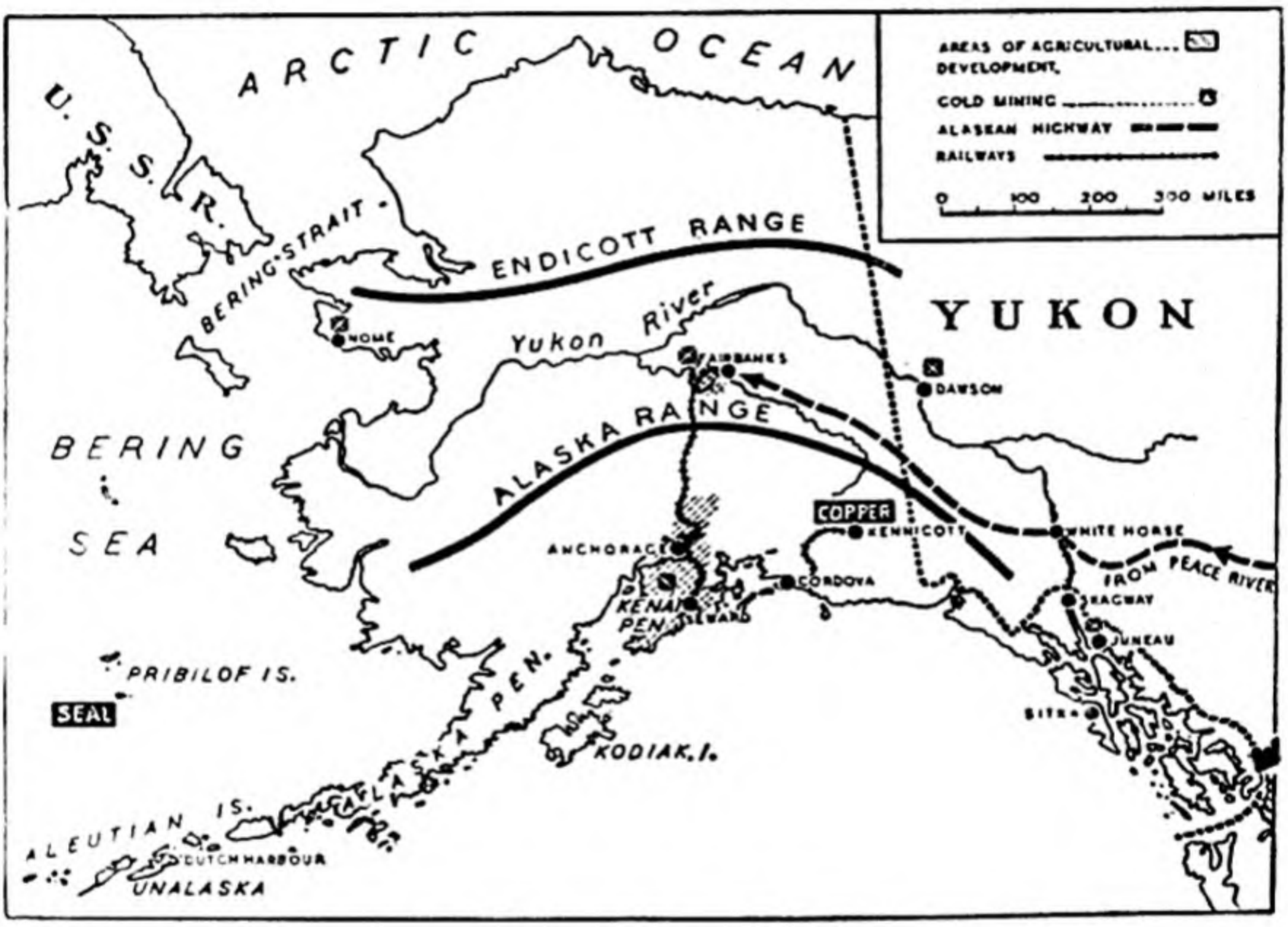


Fig. 45. ALASKA.

fibres. There is a good deal of fur-trapping in the forests and the interior, particularly of the blue fox. A number of farms also rear these foxes in captivity.

Sitka has an important harbour and engages in lumbering and salmon-canning activities. It has a large pulp mill.

Juneau (10,000), the capital, also lies in the "pan handle" coastal area which is similar to the coast of British Columbia to the south. It can only be reached by sea and a shipping service links it with the other coastal towns of Alaska.

Gold has always been the most important mineral product, obtained mainly from placer deposits. In the early days gravels were washed by individual prospectors; to-day much of the mining is done by hydraulic methods. Copper is mined in several areas, especially near *Kennicott*, which has good rail transport to the coast. Silver, platinum, tungsten, chromium, and mercury are all produced on a small scale, and good quality coal is mined. Petroleum is produced in the Kenai peninsula.

Considerable attention has been given to agricultural development in southern Alaska. Good crops of potatoes, cabbage, sugar-beet, oats, and even wheat are now grown in favoured parts, and cattle, pigs, and poultry are kept. Dairy farming in the Matanuska Valley is efficient and prosperous.

Anchorage (45,000), the largest and most modern town, has an ice-free harbour and is connected with *Seward* on the Kenai peninsula and with *Fairbanks*, on a tributary of the Yukon, by a Government-owned railway which uses locally-mined coal. It has an airport which lies on the commercial air route across the North Pole between Copenhagen in Europe and Tokio in Japan. The Arctic air routes are likely to increase in importance. Already Alaska is sometimes referred to as "the cross-roads of the world".

From the Alaska peninsula the Aleutian Islands extend 1,500 miles into the Bering Sea towards the peninsula of Kamchatka on the coast of Asia. The islands are volcanic and have a cool, damp, and foggy climate. The native Aleuts are Asiatic people but their numbers have declined since the Russians first came to the islands. They hunt the blue fox for its fur.

The island of Unalaska is important as a centre for whale and seal fisheries. The Pribilof Islands in the Bering Sea form a breeding ground for fur seals which migrate from the Californian coast. The seal herd is owned by the Government and protected by international agreement; killing is only allowed during a short season. From these islands, which yield more sealskin than any other part of the world, the skins are brought to the deep, sheltered bay of Dutch Harbour in Unalaska. This was used by ships on their way to the Yukon during the days of the early gold rushes; it has since been used as a coaling station by ships on the route between San Francisco and Nome, and has been developed as a naval and seaplane base owing to its proximity to Asia and to its strategic

position just north of the shortest sea passage between Seattle and Japan (*i.e.* a Great Circle route). Kiska, one of the westernmost islands of the Aleutians, is an important naval base. A large plant for canning salmon has been built by Japan on Kodiak Island.

Fig. 46. THE ALASKA HIGHWAY.

The Yukon Valley

The Yukon Valley may be approached by rail from Seward, or by rail from Skagway to Whitehorse and thence by the Yukon

River, which is navigable in summer. The region is rather dry, with an annual rainfall of about ten inches. Although there are a few spruce forests, much of the land is covered naturally with lichen —the food of the reindeer. In the 1890s a small herd of reindeer was brought from Siberia to the Seward Peninsula on the other side of the Bering Strait. They flourished and by 1930 there were over half a million—so many that the thick lichen carpet was grazed too rapidly. As a result the numbers dropped; there are now only a few thousand. But the removal of lichen enabled Arctic shrubs such as willow, aspen, and birch to grow more freely. These form the chief food of the Alaskan moose which now provides the main source of meat in the country.

Placer gold mining is carried on at a number of points along the Yukon River and its tributaries, especially near Fairbanks. The other gold-mining centre is *Nome*, the most westerly town on the mainland of Alaska and only 150 miles from Asia. Gold was discovered there in 1899. By 1900 Nome had a population of 20,000, but to-day there are less than one-tenth of that number. Many people leave Nome in the winter for gold-mining is only possible in summer when water is available for washing the gold-bearing gravels. Moreover, the freezing of the Bering Sea makes the region inaccessible except for three months in summer. Plans are in hand to harness the Yukon River to provide hydro-electricity.

Fairbanks (13,500) is on the direct air route between Russia and America, and may, in time, become one of the greatest airports in the world. The modern town is built of steel and concrete in striking contrast to the wooden houses of most Alaskan settlements. The surrounding district is being developed for farming. Although the winters are very severe, with several feet of snow, the summer days are long and the temperature reaches as much as 38° C. (*100° F.*). Many vegetables grow well.

The Alaska Highway, originally constructed for military purposes, links Fairbanks with the Canadian city of Edmonton, providing an overland route between the U.S.A. and Alaska. It is over 1,600 miles in length and is wide enough for two-way traffic. Throughout most of its length it is maintained by the Canadian Government. A chain of airfields, some constructed around old fur-trading posts, extends along the road, and it is possible that the route may eventually be followed by a railway.

Northern Alaska

Northern Alaska is cold and inaccessible, and until recently was inhabited only by Eskimos, who live by hunting, fishing, and by keeping reindeer. It has now been proved that between the Brooks Range and the Beaufort Sea (on the "North Slope" as the mining engineers call it) there are rich oilfields. These are to be exploited and it is expected that the area will be linked by pipeline with Anchorage by 1971. The railway may also be extended from Fairbanks to the north. This would also make possible some mining for hard minerals on the "South Slope" of the Brooks Range.

Trade and Development

Much of the development of Alaska is being carried out by Japanese industrial concerns which have been prospecting for oil, building timber mills and fish canneries, and establishing trading offices. Japan buys over three-quarters of Alaska's exports.

Hawaii

The island of Hawaii in the North Pacific gives its name to a group of volcanic islands—the Hawaiian Islands—which include Maui, Oahu, and Kauai. They are surrounded by deep seas and volcanic mountains rise to over 13,000 ft and include Mauna Loa, the largest active volcano in the world. Nearby Kilauea has the largest volcanic crater in the world.

The islands lie south of the Tropic of Cancer in the belt of the north-east Trade winds. Temperatures vary little throughout the year; the mean temperature is 24° C. (*75° F.*), and the annual range about 4·5° C. (*8° F.*). The rainfall on the windward slopes of the island is extremely heavy, reaching well over 100 in. a year in places; on the leeside it is as low as 30 in. per annum.

The islands were discovered in 1778 by Captain Cook and were annexed by the U.S.A. in 1898.

The rapidly increasing population is about 750,000, of whom some 17 per cent. are pure or part Hawaiian and one-third Japanese. There are also many Chinese and Filipinos. These groups live together in harmony, competing on equal terms in the business life of the islands.

The climate favours the growth of sugar-cane and pineapples, two crops which provide the bulk of the exports. Much of the

sugar goes to centres in the U.S.A. to be refined; most of the pine-apples are canned. Other crops include coffee and bananas.

The position of the Hawaiian Islands in the centre of the Pacific Ocean has made them important as a port of call for shipping. They are sometimes called "the cross-roads of the Pacific". Passenger liners from Vancouver to Sydney and Auckland, from San Francisco to Yokohama or Manila and Hong Kong, and from the Panama Canal to Asian ports all call at *Honolulu* (303,000), the capital city and chief port on the island of Oahu. Honolulu is also an important centre for the tourist trade which is steadily growing in importance in all the major islands.

The Hawaiian Islands have great strategic importance to the U.S.A. It was the surprise bombing of the naval base of Pearl Harbour by the Japanese in 1941 which brought the U.S.A. into the Second World War.

CHAPTER XIX

THE U.S.A.: COMMUNICATIONS AND TRADE

Communications

RAILWAYS.—The United States has nearly 230,000 miles of railway built almost entirely on the standard 4 ft 8½in. gauge. This is nearly 30 per cent. of the world's railway mileage.

The eastern parts of U.S.A. are well served by railway, but many areas in the mountainous west are long distances from the nearest line. Four trans-continental railways link the Atlantic with the Pacific coast (Fig. 47). Since passengers frequently travel long distances the trains are comfortable and well equipped. Most of the trains are drawn by diesel-electric locomotives and enormous quantities of freight are carried. The chief obstacles to railway building have been

(i) The Appalachian Mountains.

(ii) The Mississippi River and its tributaries.

(iii) The Western Cordilleras.

(i) The only easy routes across the Appalachians are by the Hudson-Mohawk Gap which is used by railways. South of this gap railways connect Philadelphia (via the Susquehanna Gap) and Baltimore (via the Potomac Gap) with the industrial area round Pittsburgh. No important lines cross the Southern Appalachians, but a line which follows the eastern edge of the mountains passes round their southern end.

(ii) Railways tend to converge on the more important bridge points across the Mississippi (*e.g.* New Orleans, Vicksburg, St Louis, etc.) and its major tributaries.

(iii) The main trans-continental lines which cross the Western Cordilleras often follow old Indian trails like the Oregon Trail and the Santa Fé Trail for part of their route.

The Northern Pacific Railway links the Upper Mississippi via the mining area of Butte with the ports on Puget Sound.

The Union and Central Pacific Line connects Chicago and Omaha with Salt Lake City and San Francisco. Another branch

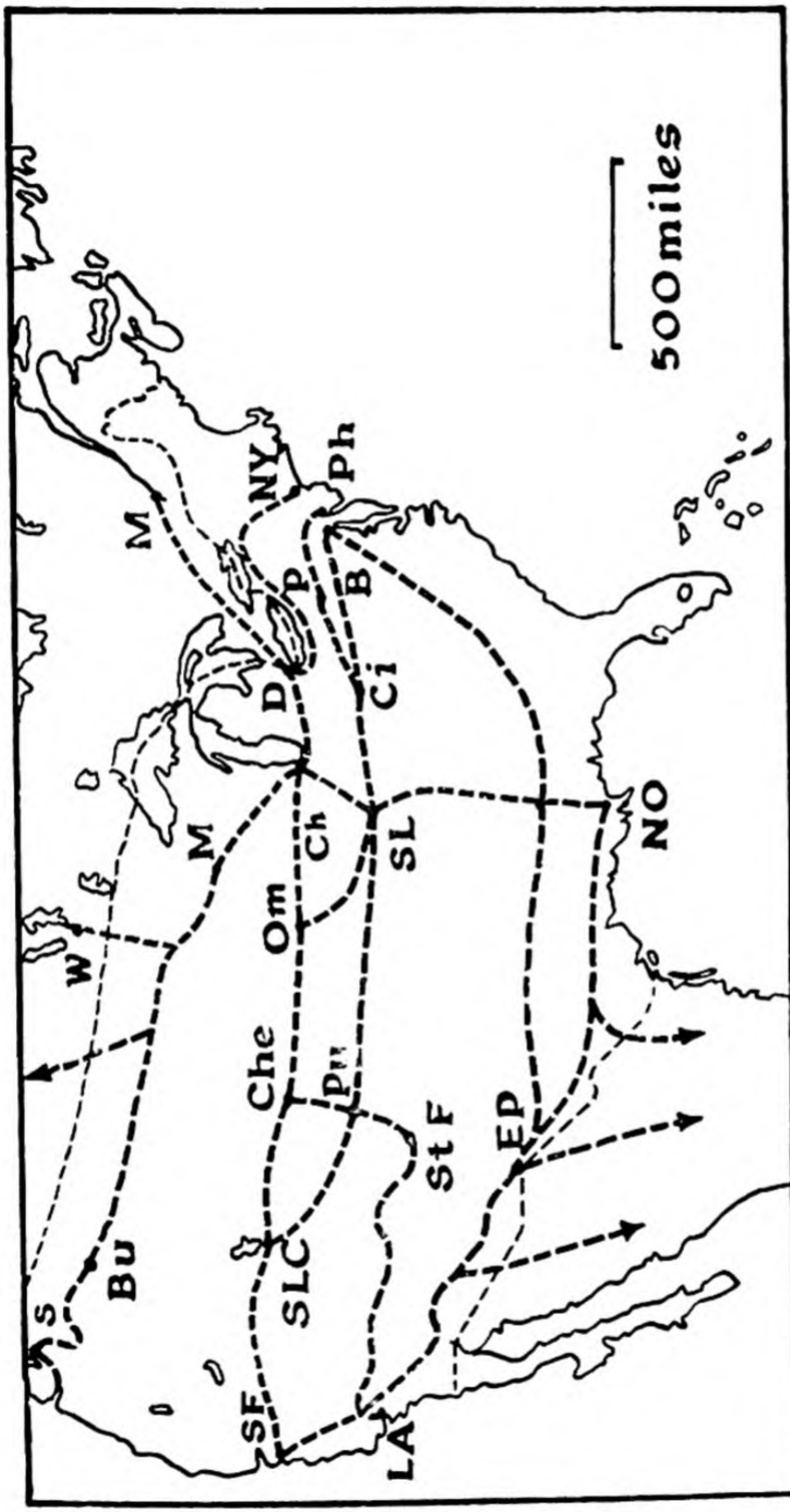


Fig. 47. TRANS-CONTINENTAL RAILWAYS OF THE U.S.A.
The letters refer to towns. They may be identified from an atlas map.

follows the Santa Fé Trail via Arizona to Southern California and San Francisco.

The Southern Pacific Railway links New Orleans via El Paso with Los Angeles.

The numerous branch lines which connect these railways with one another may be studied in any good atlas.

ROADS.—The U.S.A. has roughly one mile of good road to every square mile of country, but the roads are unevenly distributed. In the eastern states there is an excellent road system and cities like New York help to solve their traffic problems by means of "skyways", roads elevated above the congested streets. On the other hand, many areas in the west are badly served. There are, however, good east to west roads crossing the country which penetrate to many of the scenic wonders of the western mountain states. At least one person in three in the U.S.A. owns a car and uses these roads for business and pleasure, thinking little of a journey of sixty or seventy miles to visit friends.

Many new toll roads are being established in the U.S.A. to enable the truck driver or private motorist to travel non-stop between the larger cities on payment of a toll charge. A long toll road between New York and Chicago is already open. The mileage of such toll roads rose from 344 miles in 1940 to 3,880 miles in 1965.

WATERWAYS.—Although the railways and roads are the chief commercial highways, the waterways of the U.S.A. carry a large amount of freight. Heavy goods such as coal, iron, machinery, and wheat pass through the Great Lakes and along the Erie Canal and Hudson River to New York.

Of recent years there has been a great increase of traffic along the Mississippi and its tributaries, over a hundred million tons being transported annually by this system between the industrial towns of the north and the Gulf ports. Motor cars, coal, oil, foodstuffs, and cotton are among the commodities carried.

The Illinois Canal links Chicago to the Mississippi and makes it possible for ships to sail down the Mississippi to the Gulf of Mexico.

The opening of the Tennessee River by the construction of a channel connects Memphis, an industrial town and port on the Mississippi, with the rapidly developing area in the Tennessee

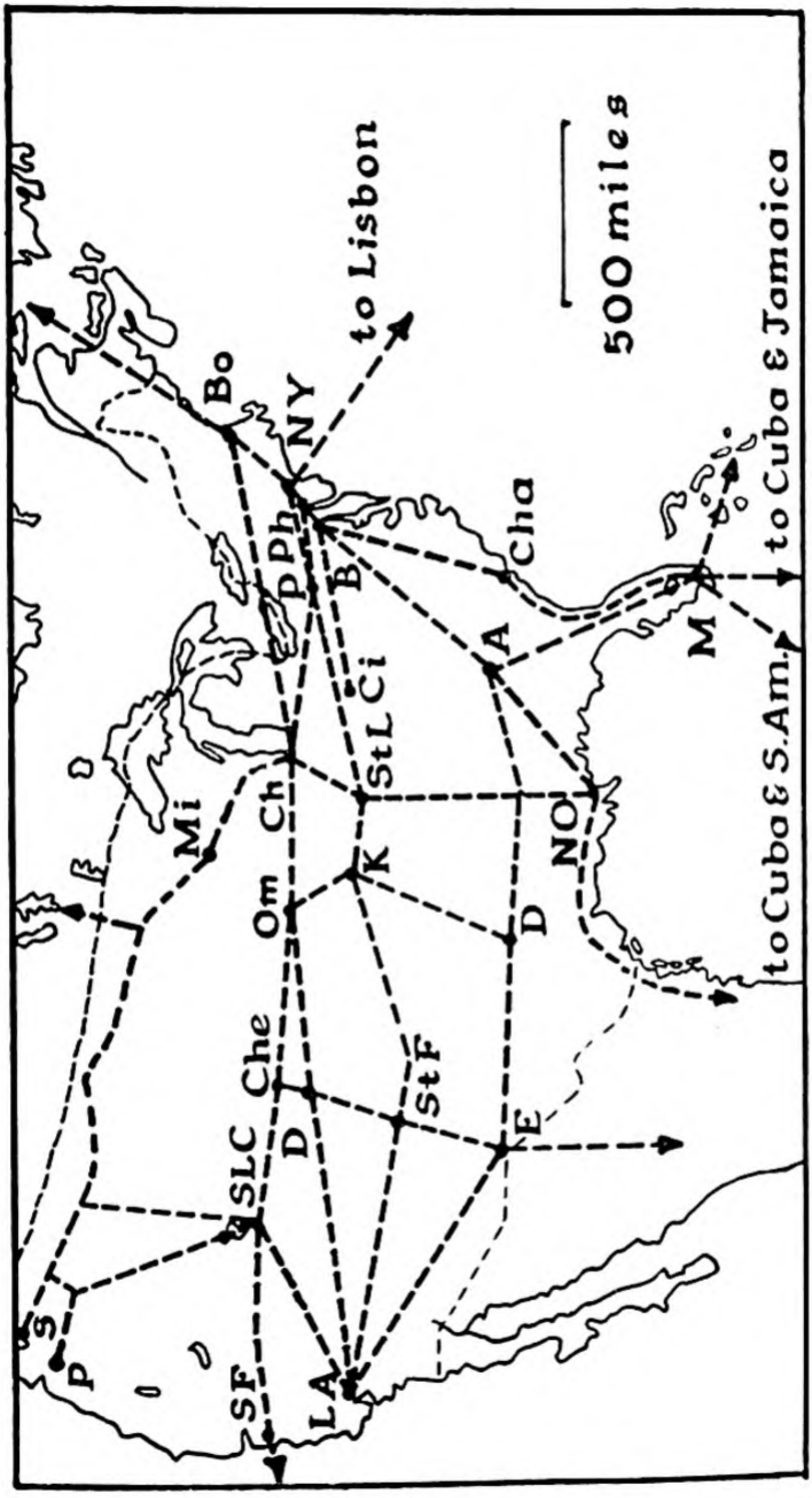


Fig. 48. Chief Airlines of the U.S.A.
Letters refer to towns. They may be identified from an atlas map.

valley. Canalised rivers transport steel from Birmingham on the Alabama coalfield to the shipbuilding centres near Mobile.

Other important transport links are the "intracoastal" canals which link up bays, rivers, and lagoons along the Atlantic coast and round the Gulf of Mexico. This waterway runs just inside and parallel to the Gulf Coast from Corpus Christi near the Mexican border to Carrabelle in north-western Florida. It is used by barges to carry sulphur, steel, and fertilisers.

AIRWAYS.—The U.S.A. has excellent air services with regular lines carrying passengers and freight from the eastern states to the Pacific, linking up all the important towns and cities (*see* Fig. 48). There are also regular services to Canada, Mexico, Cuba, and South America. Jet planes fly the Atlantic Ocean from New York to London and Paris.

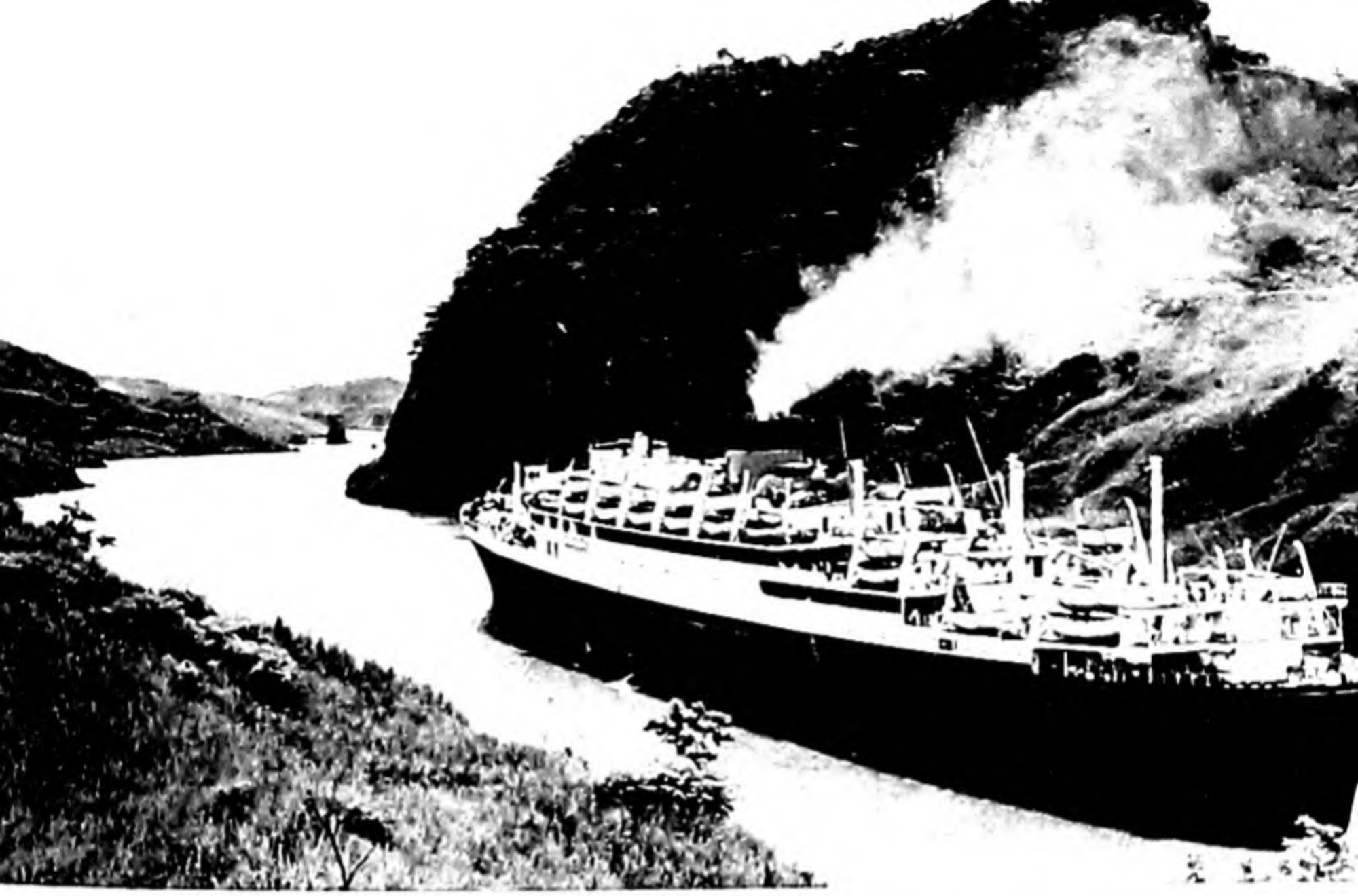
The principal air route across the Pacific links San Francisco with Singapore via Honolulu, Wake Island, Guan Island, Manila, and Saigon.

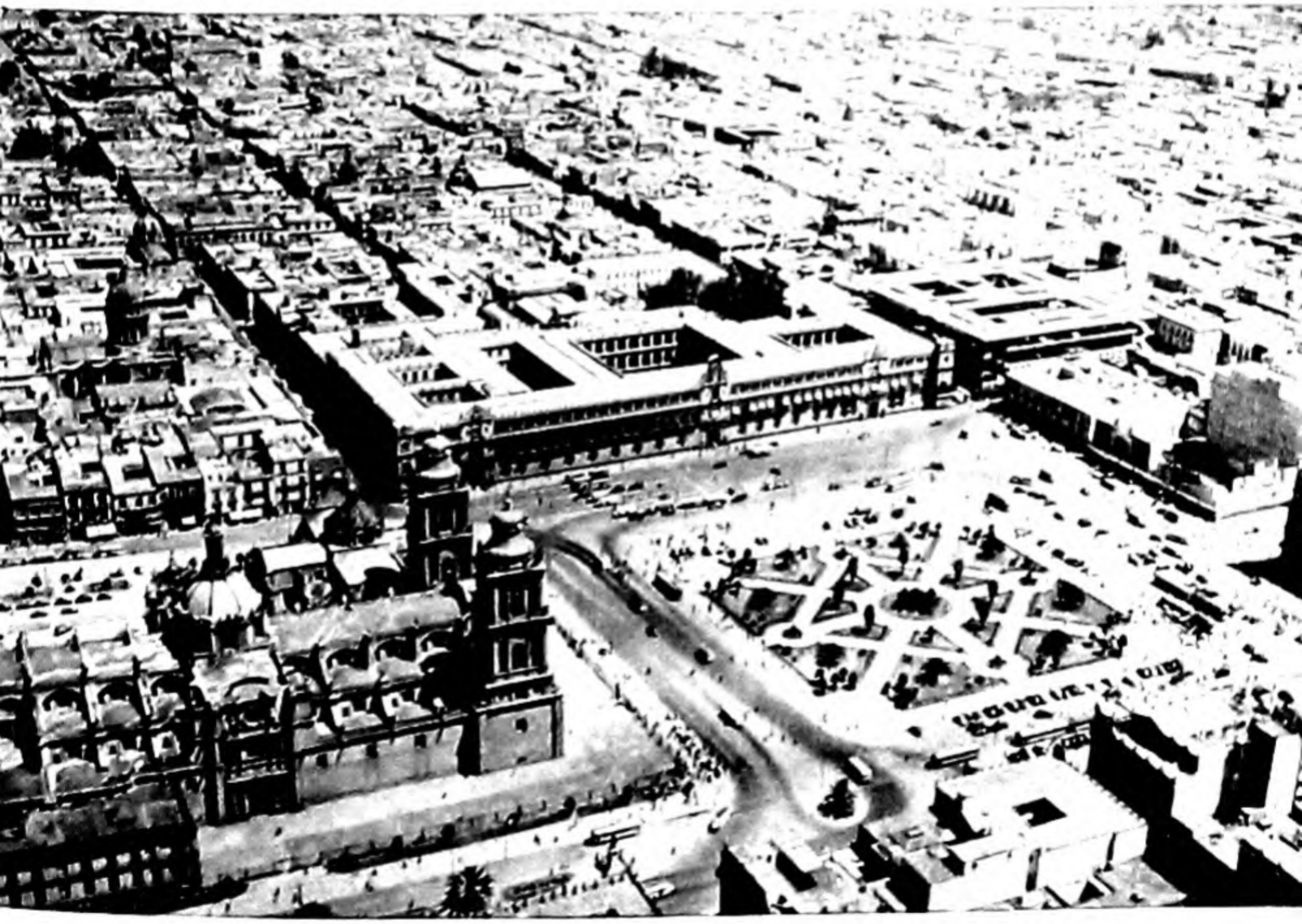
Air services within the U.S.A. are widely used. It is possible in some industrial areas to travel to work by air daily and thus to be able to live a hundred miles or more from the business town.

Trade

Until the latter part of the nineteenth century production in the United States was mainly agricultural; cotton, tobacco, and cereals were the chief exports, while manufactured goods from Europe were the principal imports. The rapid rise of American industry during the present century has reduced the export of foodstuffs from 80 per cent. of the total exports in 1880 to less than 10 per cent. in 1967. This change was partly due to the needs of a growing population and partly to a tremendous development of manufacturing industries—accelerated by two great wars. Cotton, grain, and tobacco are now the chief agricultural exports; but manufactured goods and mineral products such as machinery, motor cars, chemicals, iron and steel, petroleum, and textiles make up the bulk of the export trade. Leading exports in 1967 were:—

Machinery and vehicles ...	12,573	million	dollars
Chemicals	2,803	„	„
Grain	2,494	„	„
Tobacco and beverages	649	„	„





Above: A liner passing through the Gaillard Cut of the Panama Canal. (*United States Information Service.*)

Below: Mexico City: Constitucion Square, with (left) the Cathedral and (rear) the Government Palace. (*Acadamy News Agency.*)

Above: Bahamas—a view from the Water Tower, Nassau. (*Exclusive News Agency.*)

Below: Jamaica—a Banana Plantation. (*Exclusive News Agency.*)

Petroleum and oils	539	million dollars
Fruit and vegetables	492	,, ,,
Coal	482	,, ,,
Raw cotton	464	,, ,,
Fats, oils, and oil seeds ...	338	,, ,,

Canada is by far the largest customer of the United States, taking about one-fifth of the total exports. Japan, the United Kingdom, Western Germany, Holland, Mexico, France, and Italy are all large customers.

The character of the imports also underwent a marked change. Before 1880 the United States imported mainly manufactured goods such as machinery and textiles; after becoming a great industrial country this type of import was no longer needed. On the other hand, her industries wanted raw materials which could not be produced at home or of which she was in short supply, and she began to import rubber, wool, vegetable oils, copper, and tin, in addition to foodstuffs such as coffee, cane sugar, bananas, cocoa, and tea. The following table shows some of the chief imports in 1967:—

Machinery and vehicles ...	5,791	million dollars
Metals and metal goods ...	3,398	,, ,,
Petroleum and products ...	2,088	,, ,,
Mineral ores and scrap ...	974	,, ,,
Coffee	964	,, ,,
Chemicals	963	,, ,,
Wood pulp and paper	962	,, ,,
Textiles	812	,, ,,
Meat	645	,, ,,
Cane sugar	588	,, ,,
Fruit and vegetables	555	,, ,,
Fish	522	,, ,,

Petroleum came from Venezuela and Mexico, wood pulp and paper from Canada, coffee from Brazil and Colombia, wool from Australia and New Zealand, copper from Chile, rubber from Malaya, nickel from Canada, bauxite from Jamaica and Guyana, diamonds from South Africa, iron ore from Labrador, Venezuela, and Brazil, and vegetable oils from West Africa, Malaya, and Brazil.

In 1967, Canada supplied more to the U.S.A. than any other country—over a quarter of the imports. These included many minerals and more than half of the newsprint.

Japan came second as a supplier and West Germany third.

Imports from Europe came chiefly from the countries of Western Europe—Western Germany, Britain, Italy, France, Belgium, Switzerland, and Holland. The goods supplied included textiles, iron and steel goods, chemicals, and food.

The U.S.A. can obtain nearly all the tropical products she needs from Latin America as well as tin and bauxite, while Canada can supply her needs in wood pulp and furs. She can also find a good market for her manufactured goods in these rapidly developing countries.

CHAPTER XX

MEXICO

Position

Mexico is a triangular-shaped country which stretches from latitude 32° N. to 15° N.

Most of Mexico consists of a high plateau 3,000 ft above sea-level. The chief lowlands are narrow coastal strips which border the Gulf of Mexico on the east and the Pacific Ocean on the west. The highland is broken by a gap which cuts through the Isthmus of Tehuantepec and separates the high plateau from the Chiapas highlands in the extreme south. Such variation in relief gives rise to the following distinct natural regions (*see* Fig. 49):

(1) The Plateau.
(2) The Coastal Plain of the Gulf of Mexico.
(3) The Pacific Coastal Plain.
(4) The low limestone Plateau of Yucatan.
(5) The Chiapas Highlands.

Climate

Mexico is in the belt of the prevailing north-east trade winds, and the rainfall is therefore much heavier on the east coast than on the Pacific coast, as the following figures show:

Annual rainfall of Tampico (lat. 22° 22′ N.) 80 in.
Annual rainfall of Mazatlan (lat. 23° 25′ N.) 20 in.

On both coasts the rainfall decreases towards the north, giving rise to the semi-arid area of the mouth of the Rio Grande and the Sonoran Desert and Lower Californian Desert of the north-west. Both the Sierras have sufficient rainfall to provide streams which flow both inland and to the coasts. The plateau, which is a rain shadow area, has a low rainfall and irrigation is necessary for agriculture except in the higher facings of the south. Temperature conditions vary with altitude, and it is convenient to divide the country into the following climatic belts depending on variations of altitude and rainfall:

CLIMATIC BELTS

CLIMATIC BELT	POSITION	ALTITUDE	PRODUCTS
Paramos	Sierras	Alpine zone	Cold, bleak, and treeless.
Tierra Fria	Sierras and higher parts of plateau.	7,000 ft to Paramos	Higher parts forested where rainfall sufficient. Poor grass and scrub in drier areas. Few hardy crops.
Tierra Templada	Much of plateau and slopes of Sierras.	3,000-7,000 ft	Wetter parts of Sierras forested. Coffee on lower slopes. Maize and tobacco as chief crops. Cotton in irrigated areas.
Tierra Caliente	Hot, wet coastal lands of Gulf of Mexico.	Sea-level to 3,000 ft	Tropical rain forests which produce mahogany, logwood, etc. Chief crop—bananas.
Desert and Semi-desert	Pacific coast north of Cape Corrientes. Peninsula of Lower California.		Irrigation needed to produce cotton, sugar-cane, vegetables.

Natural Regions

(1) THE PLATEAU.—The high plateau occupies most of Mexico. It is bordered by the ranges of the eastern and western Sierra Madre, the latter being the highest. Towards the south these ranges converge and give rise to a number of intermont basins surrounded by lofty mountains many of which are extinct volcanoes. The capital, Mexico City, is situated in one of these high basins. To the north the plateau decreases in height and finally drops to the deeply-cut gorge of the Rio Grande in the north-east and to the Colorado delta in the north-west. The surface of the northern plateau is divided into many large basins or "bolsons", which have no outlet to the sea. Streams from the Sierras often form lakes and marshes on the basin floors. Larger streams like the Nazas provide water for irrigated areas such as the Laguna area near Torreon.

In the past there was much volcanic activity on the plateau and in the Sierras, which produced mineral veins and thus provided the chief source of wealth. Silver is the most important mineral and is mined near *San Luis Potosi* (195,000) and elsewhere. Mexico contributes 25 per cent. of the world's output of this mineral. Many minerals including, gold, lead, zinc, copper, and graphite are also

obtained. One million tons of sulphur a year are produced and high-grade iron is found near Durango. The rainfall of the plateau, most of which falls in summer, is only sufficient to support a scrub vegetation of cactus and poor pasture which provides food for a few cattle. Irrigation is generally necessary for agriculture and is provided by streams, springs, and wells. Companies working the mines have to build dams to provide water and power for preparing the ore, and some of this water is used to grow maize, beans, and vegetables. The most prosperous irrigated areas are:

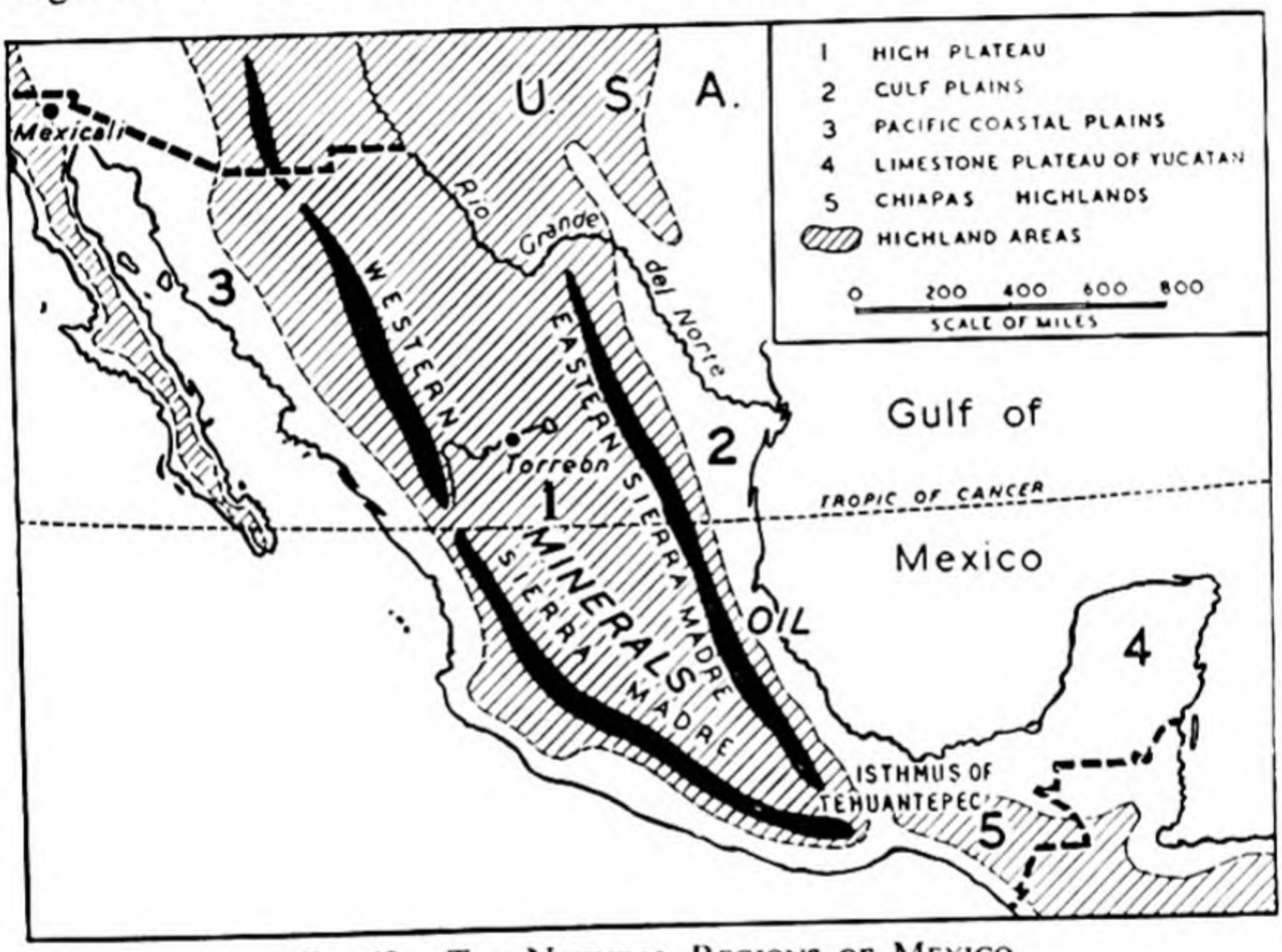


Fig. 49. THE NATURAL REGIONS OF MEXICO.

(*a*) Near the Colorado delta where the U.S.A. Imperial Canal Irrigation Scheme takes water over the Mexican border to the district around Mexicali.

(*b*) The Laguna area near Torreon where the flood waters of the Nazas River, which come in August and September, are harnessed to irrigate the surrounding country.

(*c*) The high basins near Mexico City.

In areas (*a*) and (*b*) cotton is the chief money crop. Formerly it was grown on big estates financed by foreign capital. To-day,

much of the land is under *ejido* cultivation. An *ejido* is a co-operative farming village made up of smallholdings of up to 15 acres each.

The high basins of the south (*c*) are fertile, level, and well suited to agriculture. Rainfall is usually sufficient, though some irrigation is practised. Owing to the high altitudes temperate crops such as wheat, barley, and vegetables are grown for home consumption.

Many villages are scattered over the plateau, the inhabitants living by growing maize—the principal food of Mexico—and keeping cattle. The farming is usually backward and yields are poor. The chief towns are connected with mining, e.g. *San Luis Potosi* (195,000), are market towns, e.g. *Torreon* (200,000), or industrial centres, e.g. *Guadalajara* (910,000), which commands the road and rail routes to the Pacific coast, and *Monterrey* (610,000), which produces steel.

Mexico City (4,900,000), the Federal capital, is situated in a high level basin nearly 8,000 ft above sea-level with a cool, dry climate. The town grew from a small Aztec settlement built on an island in a lake. The lake was drained, leaving fertile soil which produces grain and vegetables for the people who live in the city. All the chief railways of the Republic converge on the capital, which is the greatest commercial and manufacturing centre in the country, responsible for more than half the nation's industrial production. Hydro-electricity supplies power for motor car, textile, and food processing factories and for trains: oil and gas pipelines bring fuel from the oilfields of the Gulf of Mexico. Many poor landless peasants live in shanty towns on the fringe of the city, attracted by the need to find work. Mexico City is connected by rail with the Gulf port of *Vera Cruz*.

(2) THE COASTAL PLAIN OF THE GULF OF MEXICO.—As one descends from the eastern Sierra Madre to the Gulf Coast one passes through the Tierra Fria, Tierra Templada, and the Tierra Caliente, a hot humid, unhealthy region with heavy rainfall south of Tampico. The tropical rain forests of the southern coastal areas thin out towards the north until semi-arid conditions are found near the mouth of the Rio Grande where cotton is grown under irrigation. The forests are of little economic importance, though a little wild rubber, sarsaparilla root, and logwood are obtained. Where the land is cleared of forest some cocoa and coffee are grown. Banana plantations have been established with the help of American capital,

and most of the fruit is exported to the U.S.A. The most important product of the coastal region is petroleum, obtained south of *Tuxpan* and exported from *Tampico*. Most of Mexico's oil, however, is used within the country, for domestic purposes and in industry.

Vera Cruz (165,000) is Mexico's largest seaport.

(3) THE COASTAL PLAINS OF THE PACIFIC.—These form a marked contrast to the coastal plains fringing the Gulf of Mexico. In the north they are dry but further south some rain falls in summer. Vegetation is scanty and agriculture is only possible where streams from the Western Sierra Madre provide water. Cotton, fruit, sugar-cane, and some cereals are grown, and tomatoes are exported to the U.S.A. from *Guaymas*. *Mazatlan* is the chief mineral port. Most of the long peninsula of Lower California is also desert though irrigation is possible in the extreme north from the Colorado delta and Imperial Valley: wheat, cotton, and linseed are grown. *Mexicali* (240,000) is in the centre of the oasis area. It is linked by rail with Mexico City. A small quantity of copper is mined, and other products include guano (from desert islands) and pearl shell. *La Paz*, near the southern end of the peninsula, is the only large town. *Acapulco* is a growing resort for American tourists.

(4) THE LOW LIMESTONE PLATEAU OF YUCATAN.—This peninsula is similar in structure to Florida; both are of limestone and have little surface drainage. Yucatan has a low rainfall, decreasing to the north-west, and this fact, together with its porous limestone rock, accounts for the "karst" type of vegetation in the drier areas. Forests cover the wetter south-east but are of little economic value. The dry conditions of the north-west favour the growth of guayule, a small resinous plant about 3 ft high which produces a rubber beneath the bark to protect it from drought. It has long been known by the Indians who extracted the rubber by crude methods. The chief money crop of this area is sisal, or henequen, which is grown on peasant holdings in large quantities. It forms the chief source of wealth of Yucatan but there has been a slight decline in the production in recent years. This is partly due to the fact that replanting has not been done consistently; the plants must grow for seven years before they produce leaves for cutting, so planning for the future is essential. Moreover, there is keen competition from Kenya and Tanzania. The chief food crop is maize. Sugar, oranges, and bananas are grown.

Merida (185,000), which is connected by rail with the port of *Progresso*, is the centre of the sisal district.

(5) THE CHIAPAS HIGHLANDS.—The Chiapas Mountains enclose a valley watered by the Chiapas River. Forests grow on the higher slopes, while the valley has grassland of a savanna type on which cattle are reared. The area is undeveloped and does little more than provide for its sparse population. Maize and vegetables are the chief crops. A little coffee, cocoa, and fruit are also grown.

Very rich deposits of sulphur are worked in the Isthmus of Tehuantepéc which separates the Chiapas Highlands from the Mexican Plateau. Output is increasing and Mexico is now one of the most important countries in the world for the export of sulphur. The port of *Coatzacoalcos* is being enlarged to deal with exports.

The People of Mexico

Mexico has a mixed population of over 46 million which is rapidly increasing. The mestizos or half-castes (Indian-Spaniard) are the dominant type both numerically and politically, and they form the middle class. There are over 3 million pure Indians, who are generally poor and live in rural areas. The whites (mainly of Spanish descent) are even fewer in number and form the aristocracy. The contrast between rich and poor is very great. The large towns are modern and prosperous; the small villages of the countryside remain primitive. More than half the people of Mexico live within 150 miles of the capital, Mexico City.

Despite the contrasts between rich and poor, and the expanding population, the general prosperity of Mexico is advancing rapidly. The country is now virtually self-supporting in consumer goods for the home market and there is a ready market for its growing industry next door in the U.S.A.

Trade

The chief exports of Mexico are mineral ores (lead, silver, copper, and zinc), raw cotton, coffee, sisal, sulphur, and petroleum. Considerable quantities of manufactured goods are also exported to Latin American countries—especially Brazil, Argentina, Chile, and Peru. The U.S.A., however, is Mexico's chief buyer. Imports include machinery and raw materials for industry. These come mainly from the U.S.A.

CHAPTER XXI

THE WEST INDIES, CENTRAL AMERICA, AND PANAMA

The West Indies: Natural Divisions

The islands of the West Indies fall into three groups:

(1) THE BAHAMAS—small, low, almost waterless islands formed of coral rock which lie to the south-east of Florida.

(2) THE GREATER ANTILLES, which include the large islands of Cuba, Hispaniola, Puerto Rico, and Jamaica, with volcanic mountain ranges.

(3) THE LESSER ANTILLES, made up of two belts of smaller islands, the inner belt mainly of volcanic origin, the outer belt built of coral limestone.

The Antilles form a great curve which sweeps from the peninsula of Yucatan in Mexico to the coast of eastern Venezuela, dividing the sea into two basins, the Gulf of Mexico to the north and the Caribbean Sea to the south. The islands were formed by the subsidence of mountain ranges, only the higher parts of which now rise above the sea; submerged ridges can be traced which link the mountainous islands to the mainland (Fig. 50).

Climate

The prevailing winds are from the north-east and the northern sides of the islands therefore receive the heavier rainfall. Port Antonio on the north coast of Jamaica has an annual rainfall of nearly 140 in., whereas Kingston on the south coast of the island has an annual rainfall of only 36 in. Temperatures are high with little difference between summer and winter; the mean monthly temperatures do not fall below 21° C. (*70° F.*) and do not rise above 29° C. (*85° F.*) for places at or near sea-level, though altitude reduces the temperatures inland.

The West Indies are subject to hurricanes—violent tropical cyclones which occur most frequently in August, September, and October. These storms begin between latitudes 10° N. and 20° N.

in the region of the Lesser Antilles or near the coast of Venezuela, and sweep first west and then north towards Florida. A typical track is shown on Fig. 50. Hurricanes sometimes reach the shores of the Gulf of Mexico causing serious damage to buildings and crops.

Agriculture

With the exception of Trinidad, which has valuable mineral wealth, the West Indies are largely dependent on agriculture. The

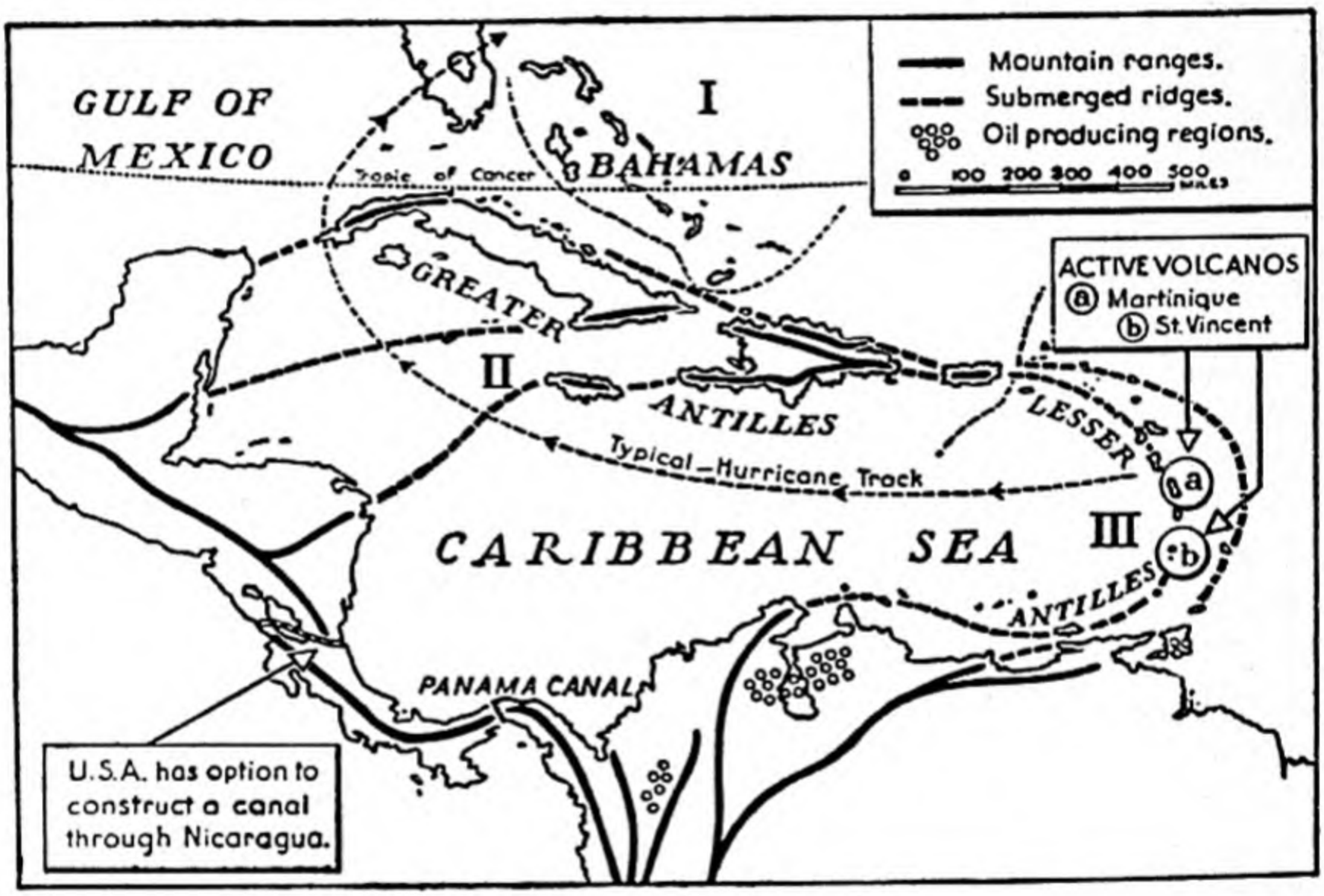


Fig. 50. THE WEST INDIES.
Map showing island groups and their structural connections with the mainland.

hot, wet climate is particularly suited to plantation crops such as sugar and bananas. Sugar-cane has always been the chief money crop, and it was to provide labour for the sugar plantations that negro slaves were brought from Africa in the seventeenth and eighteenth centuries. Negroes and mulattos now predominate in all the islands with the exception of Cuba. The emancipation of the slaves in the nineteenth century upset the economic life of the islands and the growing of sugar-beet in temperate lands brought competition, but sugar-cane still remains the staple crop.

Sugar-cane needs a good rainfall and a definite dry season, and these conditions are usually found in the southern or western parts of the islands. The plantations were originally near the sea, for at one time the sugar was rolled in barrels from the primitive crushing mills to the coast for export. Much of the higher ground is, however, more suited to the cane than the lowlands. Deep open drains run through the fields to take off surplus water and rail tracks lead to the crushing mills, as it is important to deal with the cane as soon as possible after cutting or it begins to deteriorate. Plantations are usually made in November by planting cuttings of old cane some eighteen inches in length. This is known as "ratooning". The fields must be constantly weeded, and after twelve to eighteen months they are covered with tall grass-like cane which is harvested by Negro or East Indian workers, who cut and trim it with broad bladed cutlasses. The plantations last for several years.

Transport to the factories is by rail, tractor, or bullock cart. The cane is crushed to extract the syrup which yields sugar and molasses (black treacle). When fermented and distilled the molasses yields rum.

The decline in the demand for cane sugar has caused some growers to increase the acreage under bananas, cocoa, and citrus fruits.

Cuba

Cuba, separated from Mexico by Yucatan Strait, is the largest island of the West Indies. It is a republic with a population of 8 million, two-thirds of whom are white. At one time American influence in Cuba was paramount; most of the industry and mining, the plantations and cattle ranches were developed with American capital. To-day the island is run on communist lines and there are close political and trade agreements with the U.S.S.R.

In the south-east of Cuba the land rises to over 8,000 ft, but much of the island is low and covered with rich alluvial soil. Extensive tracts are still densely forested. Sugar plantations provide the main source of wealth. A few are run by small farmers but most private estates which were formerly dependent on American money have been turned into co-operative farms. Much new land has been brought into cultivation or established as grazing pasture for cattle ranching on what are known as "People's Farms"—

similar to the state farms of the Soviet Union. Three-quarters of the cultivated land in Cuba is run in this way. Cuba is the world's chief producer of cane sugar.

High quality tobacco is grown in the west of Cuba; cigars and cigarettes are manufactured for export. Other crops include coffee, pineapples, bananas, and citrus fruits. The forests yield mahogany and cedar (used for making cigar boxes) and the rocks yield nickel, iron, copper, and manganese.

Havana (790,000), the capital and chief port, lies on the north coast, well situated for trade with the U.S.A. This trade has greatly declined, though leaf tobacco (for making cigars), fruit and vegetables are still sent to American ports. China buys large quantities of Cuban sugar and Cuba imports petroleum from Russia.

Santo Domingo (Hispaniola)

The island of Santo Domingo is separated from Cuba by the Windward Passage and is divided politically into the Republic of Haiti and the Dominican Republic.

HAITI.—This republic which occupies the western third of Hispaniola, was the first independent negro state in the world when, after a period of French control between 1677 and 1804, the islanders gained their freedom. Of a population of nearly 5 million the majority are negroes and the rest mainly mulattoes, descended from the original French settlers who intermarried with negroes. French remains the official language, but most of the people speak a dialect known as French Creole.

Coffee is the most important crop and accounts for two-thirds of the exports. Some cocoa, cotton, sisal, bananas, and sugar are grown. Logwood is obtained from the forests.

There is great poverty among the people of Haiti. Nine out of ten are illiterate and the peasant farmers find it difficult to wrest a living from the land. When the rainfall fails many people starve.

Port-au-Prince (250,000) is the capital and port. It is hot and humid.

THE DOMINICAN REPUBLIC.—This republic has a population of over 4 million and occupies the eastern two-thirds of Hispaniola. Spanish is the official language and there are close financial ties with the U.S.A. Crops include sugar, cocoa, coffee, bananas, and

tobacco. Stock raising is carried on. Some petroleum is obtained near Azue, and light industries have been established.

Santo Domingo (Ciudad Trujillo) (530,000) is the capital.

United States Territories

PUERTO RICO.—This island was acquired by the U.S.A. in 1898 and has a population of over $2\frac{1}{2}$ million. It is not so mountainous as Cuba and Hispaniola, rising to no more than 3,750 ft so that the slopes can be cultivated to the summit. The soil is fertile and grows excellent crops, but irrigation is necessary in the drier south. Sugar is grown in large quantities for export to the U.S.A. The size of the sugar estates is restricted. No man may hold more than 500 acres; the ownership of land has been spread as widely as possible in an attempt to do away with poverty. Pineapples, oranges, grapefruit, tobacco, and coffee are grown, and small quantities of cotton and maize. Textile undertakings make cotton, linen, and silk goods for export. The rich mineral resources of the island are little developed, but manganese is mined and refined locally.

San Juan (790,000), the capital, has a fine harbour on the north coast. *Ponce* (177,000), on the south coast, has sugar refineries and makes rum. It is also a useful port.

THE VIRGIN ISLANDS.—These small islands lie to the east of Puerto Rico and were purchased by the U.S.A. from Denmark in 1917. Sugar-cane is grown and rum is produced. There are three main islands, St Croix, St John, and St Thomas. St John is noted for bay oil extracted from the leaves of the bayberry, a fragrant plant of the myrtle family. St Thomas produces bay rum, made by distilling rum with the leaves of the bayberry. The pleasant climate of the islands attracts many tourists.

Charlotte Amalie on St Thomas is the capital of the islands and has an excellent harbour.

The Bahama Islands

The Bahamas lie to the south-east of Florida. They are under British protection but have internal self-government. There are some twenty inhabited islands with a total population of 150,000, together with many small rocks and reefs. At one time the shallow waters around the coasts yielded sponges, but sponge disease

has taken toll and the trade has declined. Sisal is produced and tomatoes are grown for the Canadian market.

Nassau (100,000), capital of the Bahamas, is on New Providence and noted for its winter tourist traffic from the U.S.A. In 1967 over 915,000 visitors came to the islands.

Freeport, on Grand Bahama Island, is developing very rapidly as a tourist centre with a distinctively American atmosphere. It is only 35 minutes' flying time from Miami in Florida.

THE WEST INDIES

Jamaica

Jamaica is the largest of the islands in the West Indies which is within the British Commonwealth. It lies south of Cuba and has a population of nearly two million; nine out of ten are of negro descent.

The island is cultivated largely in peasant holdings. Bananas are grown extensively in irrigated plantations on the coastal plain in the south, and sugar is grown in the wetter parts. Both these crops are declining slightly in importance while the production of high quality coffee and cocoa is expanding. Blue Mountain coffee has a considerable reputation. Other crops include sisal, ginger, citrus fruits (mainly for the juices), tobacco for cigars and cigarettes, and allspice. In the tourist area of the north coast around Montego Bay where some 350,000 visitors are catered for every year, some of the big sugar estates have been replaced by market gardens growing vegetables to meet the local demand.

Jamaica has valuable bauxite deposits and the "ore" is exported to the U.S.A. and to the aluminium centre of Kitimat (*see* pp. 69-70). Bauxite and aluminium now account for more than half the exports and Jamaica is the world's leading producer of bauxite.

The production of manufactured goods has expanded considerably in recent years. Plastics, fertilisers, clothing, shoes, glass, paint, hardboard, and motor tyres are all made for the home market and there is some export. Much industry is centred on Kingston, but new industrial estates are being sited in the rural areas to provide employment where it is most needed. Despite this, there is a good deal of unemployment in the island.

Tourism brings much wealth to Jamaica and as an "invisible export" provides nearly one-third of the revenue. ***Montego Bay***

(30,000), which has an international airport and a new deep-water harbour, attracts visitors from the U.S.A. largely because of the climate, scenery, clear water, and clean sands.

Kingston (526,000), the capital, has a fine harbour backed by the Blue Mountains which protect it from the force of the north-east Trade winds. It is the chief port.

The chief exports of Jamaica in 1967 (in thousands of £) were:—

Bauxite and alumina	39,635
Sugar, rum, and molasses	17,701
Bananas	6,562
Manufactured goods	5,032

The U.S.A., Britain, Canada, and Japan are the chief customers.

Trinidad with Tobago

Trinidad with Tobago are linked as one independent country within the British Commonwealth. The islands lie close to the coast of Venezuela in South America and they support a population of about 900,000 of which 43 per cent. are African in origin and 37 per cent. East Indian.

The main crops are sugar, cocoa, coconuts, bananas, and citrus fruits—grown mainly in plantations. Animal husbandry is being encouraged to supply meat and milk.

Mineral oils and asphalt are of much greater value than agricultural products: they make up four-fifths of the exports, though sugar takes second place. The pitch-lake at La Brea is 114 acres in extent and lies in the south-west of Trinidad. Its yield of asphalt and pitch seems to be inexhaustible. There is also a considerable, though declining, output of petroleum. Oil refineries also process crude oil imported mainly from Venezuela and Colombia.

The islands have an important tourist trade: Tobago is particularly noted for its unspoilt beauty.

Port of Spain (121,000), the capital, on the north-west coast of Trinidad, is the busiest port in the West Indies. The inland town of *Arima* (11,000) has an industrial estate making paint, glass, soap, and clothing. It is linked with Port of Spain by a fine highway. Chemical fertilisers and cement are made near *San Fernando* (40,000).

Barbados

Barbados is the most easterly island of the West Indies and the most densely peopled with a quarter of a million inhabitants and an average density of 1,500 per square mile. The coral soil holds moisture well and sugar, which is very carefully and scientifically cultivated in plantations, has always been the chief crop. During times of trade depression the dangers of depending on a single crop have been obvious and there has been a great deal of unemployment. A little sea island cotton is now grown.

Bridgetown (12,000), the capital of this British Commonwealth country, has a deep-water harbour which will berth a limited number of ships.

West Indies Associated States

A number of smaller islands which have been British Colonies for very many years have now acquired a new political status. They are "States in association with Britain," which means that they have internal self-government but defence and external affairs are managed by Britain. They have the right, however, to declare themselves completely independent if they wish without consulting Britain. These islands include Antigua, Dominica, Grenada, St Kitts—Nevis—Anguilla, and St Lucia. Their importance can be summarised as follows:—

Antigua

Population, with Barbuda, 63,000. Chief exports—sugar, cotton, and molasses. Capital: *St John's* (25,000).

Dominica

A mountainous fertile island with 69,000 people. Chief exports —bananas, lime juice, cocoa, copra. Chief town: *Roseau* (12,000).

Grenada

A mountainous fertile country with 102,000 people. Exports are cocoa, nutmegs, mace, limes, and bananas. Chief town: *St George's* (8,500).

St Kitts—Nevis—Anguilla

A single unit with St Kitts as the largest island. Total population, 57,000. Exports: Sugar, molasses, coconuts, and salt (from Anguilla). Capital: *Basseterre* (on St Kitts) (16,000).

St Lucia

A mountainous forested island with population of 110,000. Chief exports—bananas, copra, and cocoa. Capital: *Castries* (25,000), a fine sheltered port with 40,000 people.

Other West Indian islands within the Commonwealth include:

ST VINCENT, with 90,000 people. Chief exports—cotton, arrow-root, copra, and cocoa. Capital: *Kingstown* (21,000).

CAYMAN ISLANDS, with under 8,000 people. Capital: *George Town* (3,000).

BERMUDA lies several hundred miles out in the Atlantic to the north-east of the West Indies proper. It is Britain's oldest colony, with 50,000 people, and consists of coral rock. The climate is mild and Bermuda is visited by American tourists especially in winter. The main centre is *Hamilton* (3,000).

The Future of the West Indies Commonwealth Countries

The total population of these islands is approaching 4 million and is increasing very rapidly. Over one-third of the population is under fourteen years of age, a state of affairs largely due to an improvement in health services which has reduced infant mortality. The number of people is outstripping food supplies and housing and there is much poverty, unemployment, and overcrowding. The most immediate need of the West Indies is increased production, especially of saleable crops other than sugar.

All the islands suffer in some degree from over-population; many workers have left for Britain in order to get regular work. West Indian immigrants are only admitted to Britain if they have jobs waiting for them.

Other Islands of the West Indies

The islands of Guadeloupe and Martinique, with populations of 290,000 and 322,000 respectively, are overseas departments of France. Their chief products are sugar, rum, coffee, and bananas. Martinique is known for its famous volcano, Mont Pelée, which erupted in 1902 and destroyed the town of Saint Pierre.

The self-governing Netherlands Antilles, with 210,000 people, include the islands of Aruba and Curaçao, off the coast of Venezuela. On both islands oil refineries process the crude oil from Venezuela. The capital of Curaçao is *Willemstad* (45,000).

CENTRAL AMERICA

South-east of Mexico extends a narrowing isthmus which connects North and South America and embraces the six countries of Belize (formerly British Honduras), Guatemala, Honduras, Salvador, Nicaragua, and Costa Rica. It is an extension of the Western Cordilleras and a mountainous ridge runs from the Isthmus of Tehuantepéc in Mexico to Panama, broken only by the depression in which Lake Nicaragua lies. The mountains lie close to the west

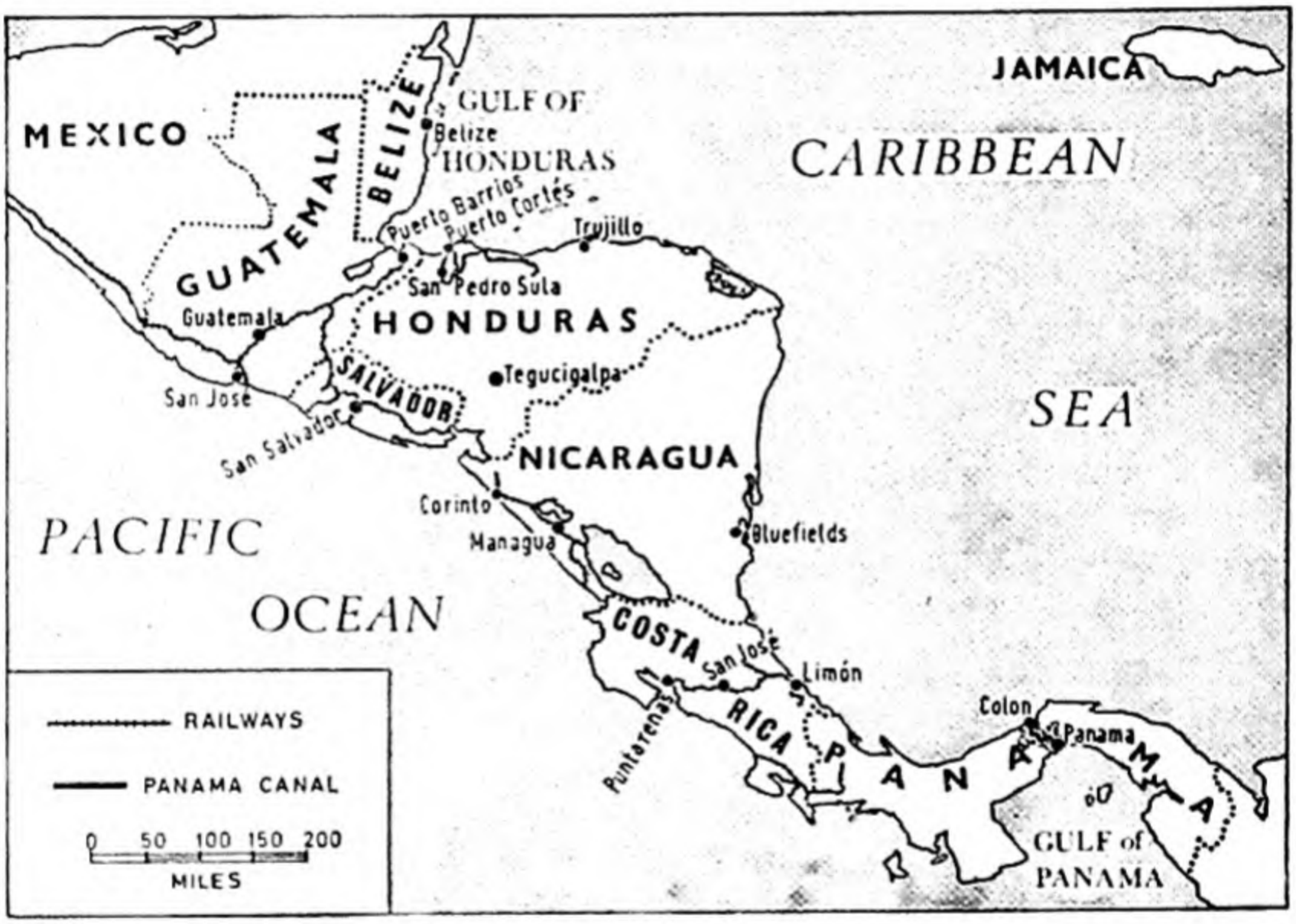


Fig. 51. CENTRAL AMERICA.

coast; to the east there are extensive lowlands especially in Guatemala, Belize, Honduras, and Nicaragua. In Costa Rica the isthmus narrows to join Panama.

Central America lies in the belt of the north-east Trade winds so that the heaviest rainfall is along the Atlantic coastline and on the main lowland areas. The west coast is a little drier but heavy storms of tropical rain fall everywhere and the mean annual rainfall varies between 40 and 100 in. Vegetation depends mainly on altitude. The belts described in the chapter on Mexico (*see* p. 164) can also be recognised in Central America. The *Tierra Caliente* or tropical rain forest is found near the coast and on the lowlands.

The *Tierra Templada* is forested only in the wetter parts. There are considerable areas of open grassland. The *Tierra Fria* is cool and has much open grassland.

With the exception of Belize, the countries of Central America are independent republics. Their stability and prosperity are very important to their powerful neighbour—the U.S.A.

Belize

Belize (formerly British Honduras), which is a self-governing country within the British Commonwealth, has a population of 115,000. It has a heavy rainfall and the hot, moist lowlands are densely forested. The forests yield mahogany, cedar, and log-wood. Chicle gum—used extensively in the U.S.A. for the manufacture of chewing-gum—is collected as sap from forest trees. Coconuts flourish along the coast and there are plantations of citrus fruits, bananas, pineapples, and sugar-cane. There is a flourishing lobster, shrimp, and anchovy fishery along the coast. The tourist industry is increasing in importance.

Belize (45,000), the capital and chief port, also serves eastern Guatemala and the southern parts of the Yucatan peninsula. Much of the town was destroyed by a hurricane and flood in 1961. The harbour exports hardwoods, especially mahogany, and oranges, grape-fruit, and chicle.

Belize is built in an area of mangrove swamps and to avoid flooding many buildings are constructed on stilts. A new capital is to be built some 50 miles inland.

Guatemala

The most northerly republic of Central America, Guatemala has a population of about $4\frac{3}{4}$ million; about half the people are of pure Indian descent. It has Atlantic and Pacific coastlines; a high mountain range with many old volcanic peaks forms the backbone of the country which is subject to earthquakes.

Hardwoods, bananas, and chicle are produced on the lowlands. Coffee, which is the chief export, is grown on the mountain slopes, hides are obtained from the open pastoral areas on the higher land, and some gold is mined in the mountains.

Guatemala (575,000), the capital, centrally situated in the cool uplands, is linked to both the Atlantic and Pacific coasts by a railway which runs from *Puerto Barrios* (32,000) to *San José*.

Guatemala is very anxious to link up with Belize; one reason for this is the desire to have the use of Belize as an Atlantic port for the northern part of the country. It suffers, however, from political instability and unrest is rife.

Honduras

Honduras is similar in structure to Guatemala but the Atlantic coastline is long and the Pacific coastline on the Gulf of Fonseca is short. The banana plantations on the lowlands are extensive and Honduras is one of the world's chief banana exporting countries. Other lowland crops include oil palms, coconuts, cocoa, sugar, and rice. The mountain slopes and uplands produce coffee, maize, and tobacco, and are important for cattle rearing. Indeed, cattle are exported from Honduras to other parts of Central America. The mountains yield gold and lead.

Tegucigalpa (225,000), the capital, is on the cool uplands. *San Pedro Sula* (120,000) lies in a cattle raising area in the north west. It is one of the most rapidly growing centres in Central America with engineering factories and milk processing plants. The chief Atlantic port is *Puerto Cortes* (30,000).

Salvador

Salvador is the smallest republic of Central America but the most densely peopled with a population of over 3 million. There is a narrow belt of hot, wet lowlands along the Pacific coastline where rice and sugar-cane are grown. Inland, the gentler mountain slopes produce considerable quantities of coffee (the chief export) and cotton, especially in the west. In the east of the country some sisal is grown.

The chief agricultural areas are served by a railway which runs from the Gulf of Fonseca, through the upland areas and *San Salvador* (260,000), the capital, to join the main Guatemala railway.

Nicaragua

The largest republic of Central America, Nicaragua, has a population of about 2 million—mainly people of mixed blood.

though some are Spanish. There are considerable areas of lowland important chiefly for crops such as bananas, cotton, sugar-cane, and cocoa. Coffee is grown on the mountain slopes and maize on the cooler uplands.

Some gold and silver are mined in the northern mountains.

Communications in Nicaragua are difficult. There are no major railways on the Atlantic coast which is linked with the Pacific coast by air services. The coastal plain on the west is served by railways. The chief towns are *Managua* (300,000), the capital on Lake Nicaragua, *Corinto* (10,000), the chief Pacific port, and *Bluefields* (18,000), on the Atlantic coast. Exports include cotton, coffee, gold, timber, and sugar.

Costa Rica

Costa Rica, with a population of 1½ million, is a narrow country, with little more than 100 miles between the Atlantic and Pacific coasts, but the mountainous ridge between rises in places to over 6,000 ft, and has a number of volcanoes. Several have long remained dormant but have recently shown signs of renewed activity. Mount Arenal in the north of Costa Rica erupted violently in 1968 causing many deaths and serious damage.

The coastlands are hot and wet; the uplands are cooler. Crops include bananas, sugar-cane, rice, cocoa, and good quality coffee which supplies 40 per cent. of the exports. These are sent mainly through the Atlantic port of *Limon* (45,000). The chief Pacific port is *Puntarenas* (65,000) which, with other Pacific ports, exports bananas. Gold and silver are mined in the west.

Costa Rica is linked for trading purposes with Nicaragua, El Salvador, Guatemala, and Honduras in a Central American Common Market.

San José (190,000), the capital and chief industrial centre, lies in the mountains on the Pacific side and is linked with Limon and Puntarenas by railway.

Panama

Panama was once part of the South American country of Colombia but became an independent republic in 1903. It has a population of 1¼ million. Much of Panama is forested and timber, especially mahogany, is produced for export. Bananas, cocoa,

and sugar are grown for export and there is a flourishing shrimp industry. A railway links the Atlantic and Pacific coasts. *Panama City* (275,000) is the capital.

The Panama Canal

The suggestion that a canal should be made across the narrow isthmus of Panama was first made as far back as 1849, shortly after the discovery of gold in California. Thousands of people were anxious to reach the west coast of North America and the three possible routes were all fraught with difficulties. Some travelled

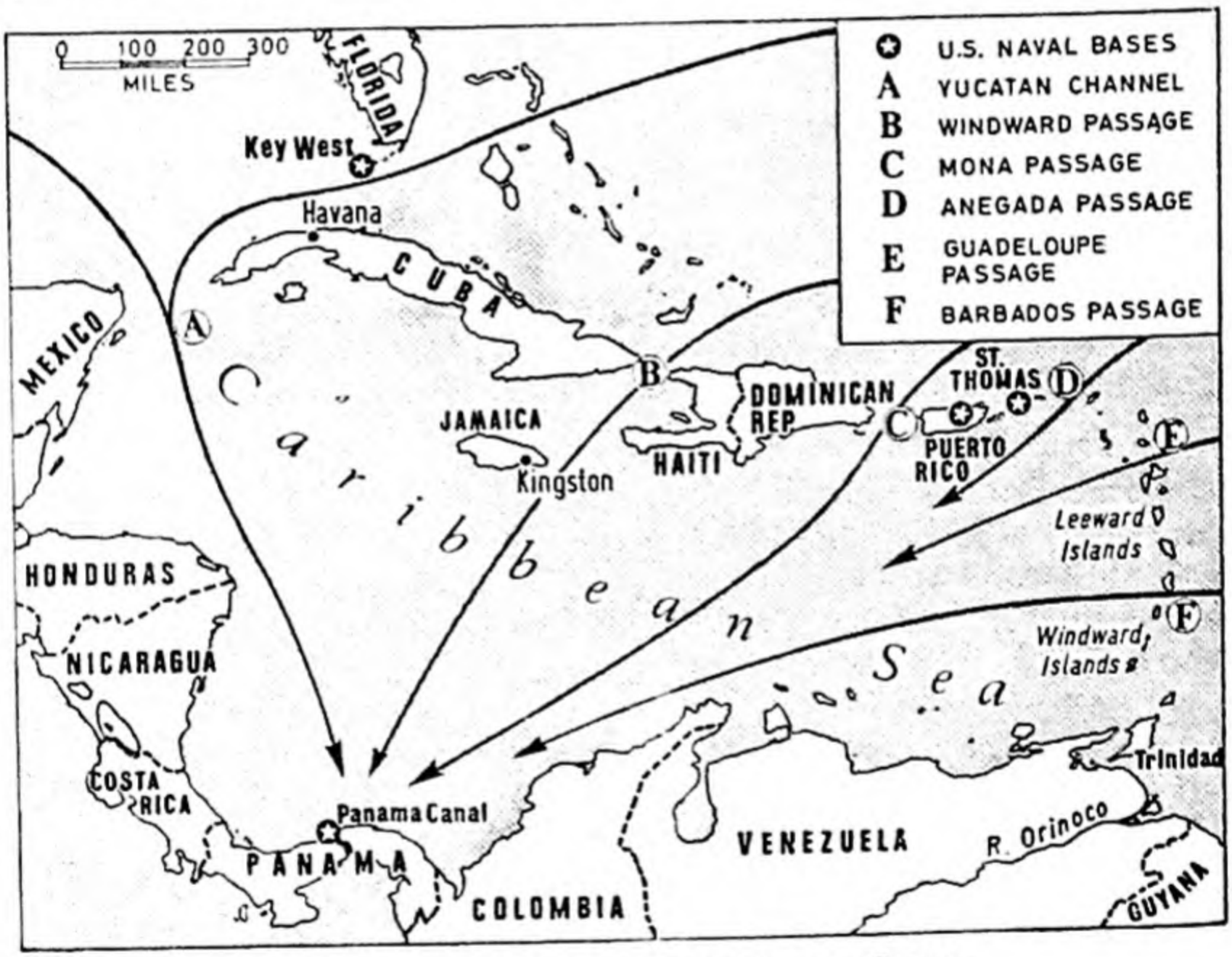


Fig. 52. APPROACHES TO THE PANAMA CANAL.

across the Mississippi lowlands and the Rocky Mountains and braved the danger from hostile Indians, some faced the stormy sea-passage round Cape Horn, while others trekked through the disease-ridden forests of the isthmus of Panama.

Several schemes were started, the most ambitious by the French engineer De Lesseps, who had already successfully completed the Suez Canal. Work began in 1882, but thousands of his men died

with yellow fever and malaria and eight years later he abandoned the attempt.

In 1903 the U.S.A. was granted jurisdiction over a strip of land by the Republic of Panama in return for an annual payment. A year later work started in this "Canal Zone" as it came to be called. The first task was to eradicate the germ-carrying mosquitoes and other insects. Mosquitoes breed in stagnant water, and all pools and marshes were therefore drained away or covered with oil. Much of the dense undergrowth was cleared, new water supplies and a good underground drainage system were provided. The death rate dropped rapidly and the canal was constructed. To-day the Canal Zone is the healthiest tropical area in America.

The isthmus of Panama is nearly fifty miles wide with a high ridge in the centre. In order to pass through this high land it was necessary to make a deep nine-mile long cutting, known as the Culebra or Gaillard Cut, which in one place is nearly 400 ft deep. The water of the Rio Chagres was imprisoned to form the Gatun Lake and great locks were built to raise and lower ships. The canal was opened in 1914.

At Colon, on the Atlantic coast, ships are lifted eighty-five feet by the three great Gatun locks to the level of the Gatun Lake, across which they steam to enter the Gaillard Cut. At the Pacific end they are lowered by the Pedro Miguel and Miraflores locks, each 1,000 ft long and over 100 ft wide. It is a surprising fact that the port of Balbao on the Pacific coast is twenty-seven miles east of Colon on the Atlantic. The passage of ships is slow owing to the delays caused as they pass through the many locks.

The Panama Canal is of great strategic and commercial importance to the U.S.A. It makes possible the transference of the American Fleet from the Atlantic to the Pacific or vice versa in a short space of time, and it reduces the sea distance between east and west coast ports by over 8,000 miles.

The islands of the West Indies are of considerable strategic importance for they form a protective arc to the east of Panama. Jamaica, nearest to the canal, is particularly important from this point of view.

Britain has also gained by the construction of the Panama Canal which opened up a shorter route to New Zealand and to the west coasts of Canada, the U.S.A., and South America.

Traffic through the Panama Canal increases every year. In 1967 a record of 12,413 transits carried over 86 million tons of cargo.

QUESTIONS

Chapter I

1. Show how the geographical conditions under which the Eskimos live have affected their (*a*) occupations, (*b*) dwellings, (*c*) clothing, (*d*) food.

2. On an outline map of North America show by distinctive colours the approximate areas originally occupied by (*a*) French, (*b*) Spanish, (*c*) English.
Write the words Negro, Eskimo, Indian over areas where each of these peoples live in large numbers to-day.

Chapter II

3. Describe three ways in which volcanic activity has affected the western part of North America and give examples.

4. Make a sketch showing the chief relief divisions of North America and their names. Indicate the directions of the main rivers by long arrows and on each write the name of the river.
Choose one relief division and describe it in detail.

5. Discuss four ways in which the glaciation of North America has affected the lives of its people.

Chapter III

6. A, B, C, D, are four towns in North America, of which the mean monthly temperatures (Centigrade and Fahrenheit) and rainfall (inches) are shown in the figures given in the table on the next page.
(*a*) Describe the climate of each town as shown from the statistics given.
(*b*) Suggest the name of each town and give reasons for your suggestions.

7. On an outline map of North America show clearly the chief areas of forest. Choose two of these areas and in each case describe the type of forest and indicate its economic importance.

8. Describe and give reasons for the differences in temperature between Victoria and St John's as shown in the table in Chapter III.

9. Say what you know about each of the following and in each case describe its effect on the climate of the area where it occurs.
(*a*) Chinook; (*b*) Californian Current; (*c*) Hurricane.

Chapter IV

10. On an outline map of Canada mark clearly one area of dense population and one area of very sparse population. Give reasons for your choice.

11. (*a*) Using figures given in Chapter IV, p. 25, draw a graph to show the rise of population in Canada between 1871 and 1941.
(*b*) In what period was the rise most rapid and what factors contributed to this increase?

			JAN.	FEB.	MAR.	APL.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ALTITUDE IN FEET
A	Temperature	(° C.)	−19	−19	−10	4	11	17	19	17	12	6	−4	−14	786
		(° *F.*)	*−2*	*−2*	*15*	*39*	*51*	*63*	*66*	*63*	*54*	*42*	*25*	*7*	
	Rainfall	(in.)	0·9	0·8	1·3	1·6	2·2	3·3	3·2	2·2	1·9	1·4	1·0	0·9	
B	Temperature	(° C.)	−1	0	2	4	8	11	13	13	11	7	3	1	62
		(° *F.*)	*30*	*32*	*35*	*40*	*46*	*51*	*55*	*55*	*51*	*44*	*37*	*33*	
	Rainfall	(in.)	7·1	6·8	5·6	5·4	4·3	3·5	4·0	7·1	9·7	11·7	8·8	7·4	
C	Temperature	(° C.)	19	20	22	23	26	27	28	28	27	25	23	21	5
		(° *F.*)	*66*	*68*	*72*	*74*	*79*	*81*	*82*	*82*	*81*	*77*	*73*	*69*	
	Rainfall	(in.)	3·3	2·5	2·8	3·1	5·9	7·9	7·2	7·3	9·9	9·2	2·4	2·2	
D	Temperature	(° C.)	10	11	11	12	13	14	14	15	16	15	13	11	207
		(° *F.*)	*50*	*51*	*51*	*54*	*56*	*57*	*57*	*58*	*59*	*58*	*56*	*51*	
	Rainfall	(in.)	4·8	3·6	3·3	1·7	0·7	0	0	0	0·3	1·0	2·6	4·7	

Chapter V

12. Name, describe, and account for two important industries of Newfoundland and illustrate by a sketch map showing chief towns and areas concerned.

13. Say what you know of the following and in each case account for its effect on the lives of the Newfoundlanders.
(*a*) Fiord; (*b*) Labrador Current; (*c*) Grand Banks.

Chapter VI

14. Describe the physical characteristics of the interior of the Atlantic Provinces and explain why comparatively few people live there.

15. Name the four chief industries of the Atlantic Provinces and give reasons for the location of each.

16. Draw a sketch map of the St Lawrence Basin and show clearly the following:—

(*a*) Chief interruptions to through traffic and the canals which by-pass these obstructions.

(*b*) The southern edge of the Canadian Shield and the Hudson-Mohawk and Richelieu gaps.

(*c*) The sites of Quebec, Montreal, Ottawa, Toronto, Buffalo, Chicago, Duluth, Port Arthur.

(*d*) Areas where the following products are obtained: Iron ore, coal, timber, fruit, wheat.

17. Give your reasons why the St Lawrence Lowlands round Montreal form an important industrial area and name some of the industries.

18. Describe the main types of farming carried on in the St Lawrence Lowlands and Lake Peninsula mentioning farm produce which is exported overseas.

Chapter VII

19. Discuss the Canadian Shield under the following headings:—
(*a*) Scenery; (*b*) Climate; (*c*) Natural resources.

20. Describe and account for the methods of transport used on the Canadian Shield region.

Chapter VIII

21. On an outline map of Canada mark in the Prairie Wheat Lands and show clearly the ways by which the grain reaches the coast. Name the terminal ports and collecting centres.

22. Discuss the main reasons why wheat is extensively grown on the Prairies. Describe and account for any changes which have taken place in recent years in the distribution of wheat-growing areas in the Prairie provinces.

23. Give a reasoned account of the chief products of Alberta.

Chapter IX

24. Describe the fishing industry of British Columbia and compare it with that of Newfoundland.

25. What are the chief occupations of the interior of British Columbia and why are there few inland towns?

26. Draw a sketch map to show why Vancouver is an important port.

CHAPTER X

27. Describe the scenery and name the chief towns passed through on a journey by Canadian Pacific Railway from Montreal to Vancouver.

28. On graph paper draw rectangles to show the relative values of Canadian exports shown by figures on page 76. Name districts which supply any four of these commodities.

29. What is a Time Zone and why is Canada divided into a number of time zones? When the local time of Toronto (Longitude 79° W.) is 9.00 a.m., what is the local time of (*a*) Prince Rupert (Longitude 130° W.); (*b*) Greenwich (England)?

CHAPTER XI

30. The citizens of America are derived from many nationalities. Discuss this statement.

CHAPTER XII

31. Give some reasons why New England has become an important industrial region. Name the principal industries and the towns in which they are carried on.

32. Draw a sketch map to show why New York is an important port and industrial area.

33. In what ways has the climate of Florida helped in her development? Illustrate by a sketch map.

CHAPTER XIII

34. Draw a section from west to east to illustrate the main divisions of the Appalachian Mountain System.

35. On a sketch map show the chief coalfields and iron deposits of the Appalachians. Give a reasoned account of the industries and towns of one of these coalfields.

CHAPTER XIV

36. Describe the scenery and occupations of the Ozark and Ouachita Hills and give reasons why they differ from the surrounding Mississippi Lowlands.

37. Indicate the position of the Spring Wheat Belt in the U.S.A. Why is wheat extensively grown in this area? What other crops are cultivated in this belt and for what purposes are they used?

38. Why is so much maize grown in the U.S.A. and yet so little exported? Name another area in the world where maize is grown for export.

39. Draw sketch maps to show the importance of (*a*) Chicago; (*b*) Pittsburgh.

Chapter XV

40. (*a*) Using the figures given at the beginning of Chapter XV for the world production of raw cotton, draw rectangles to compare the production of each area.

(*b*) On an outline map of the world mark in and name the cotton-growing areas in the countries named in the table of figures given.

41. On a sketch map show the location of the Cotton Belt of the U.S.A. and indicate the factors which have limited its extent.

42. Describe the cultivation and preparation of cotton from seed to bale.

43. Where are the two chief cotton manufacturing areas in the U.S.A.? Contrast the development of the industry in these areas and give reasons.

44. Describe the main industries of the coast lands round the Gulf of Mexico, and name the most important towns concerned with these industries.

45. Compare and contrast the River Mississippi and the River St Lawrence under the following headings:—

(*a*) Physical characteristics;
(*b*) Tributaries;
(*c*) Goods transported by river.

46. Give a reasoned account of the High Plains under the following headings:—

(*a*) Climate; (*b*) Industries and towns.

47. Contrast life and work on a farm in the Cotton Belt with the life and work on a Prairie farm in Manitoba.

Chapter XVI

48. Describe and account for some of the scenic wonders which occur in the mountain states and indicate the location of each.

49. Utah has less than 17 in. annual rainfall, yet it produces many important farm products. Name two of these products and explain how they are produced. Name two mineral products and two important towns. Illustrate your answer by a sketch map.

50. Draw a sketch map to show the chief railways and air routes which pass through the mountain states and link the Mississippi Basin with the west coast. Show the chief towns which are rail centres or ports on the west coast.

Chapter XVII

51. Why is California an important fruit-producing area? Name some of the fruits grown and describe how they are prepared for market. Name a fruit-growing area in another continent which has a similar climate.

52. Compare the position and trade of Seattle and San Francisco.

Chapter XVIII

53. Draw a sketch map to show the route of the Alaska highway through the Yukon and Alaska. Discuss the effect which this road has had on the development of Alaska.

54. What are the natural resources of Alaska? How far have they been exploited?

Chapter XIX

55. What foodstuffs and raw materials cannot be produced in the U.S.A.? Give reasons and state from which countries they are imported.

56. Select one trans-continental railway in the U.S.A. and describe (*a*) the chief natural regions through which it passes; (*b*) the economic importance of each of these regions.

57. Name two areas in North America where soil erosion has taken place on a large scale. In each case indicate the causes and the remedies which have been undertaken to combat it.

58. On an outline map of North America indicate the principal mineral-producing areas other than coal and oil. Name the chief minerals produced in each area.

Chapter XX

59. Name the areas in Mexico which produce the following and, where possible, give reasons:—

(*a*) Sisal; (*b*) Petroleum; (*c*) Silver; (*d*) Cotton.

60. Show how altitude affects vegetation in Mexico.

EXAMINATION QUESTIONS

The following examination questions have been reproduced by permission of the various Examining Bodies: (*C.*) Cambridge, (*L.*) London, (*N.*) Northern Universities, (*O.*) Oxford, (*O. & C.*) Oxford and Cambridge Joint Board, (*W.*) Welsh Joint Education Committee.

1. *Either* draw a map to show the route of the Canadian Pacific Railway from Vancouver to St John. Indicate on the map (*a*) chief towns; (*b*) the pastoral and agricultural areas; (*c*) the mining and industrial districts through which the railway passes. Account for the importance of this railway;

Or draw a map of the New England States of U.S.A. and comment upon them under the headings (*a*) relief and drainage; (*b*) climate; (*c*) economic development. (*W.*)

2. Write an essay upon any *one* of the following:—

(*a*) The oilfields of the U.S.A.

(*b*) The geographical importance of the Panama Canal. (*W.*)

3. Describe briefly or show by separate sketch maps the geographical conditions which favour the location of four of the following: (*a*) sugar growing in Jamaica; (*b*) flour milling at Minneapolis—St Paul; (*c*) meat canning at Chicago; (*d*) steel industry at Pittsburgh; (*e*) aircraft industry in Los Angeles—San Diego region. (*W.*)

4. Write an essay on the industrial resources of the Great Lakes region of North America. (*W.*)

5. Give a careful account of the geography of the Wheat and Maize Belts of North America. Comment upon the export trade of this region. (*W.*)

6. (*a*) Name four widely separated regions of large-scale fruit farming in North America excluding Mexico and the West Indies.

(*b*) Name the chief fruits grown in each of these four regions.

(*c*) Describe the climatic conditions which favour fruit growing in each of the four regions. (*N.*)

7. Fig. 53 shows three areas of dense population and two areas of sparse population in North America. (*a*) Explain (i) why areas marked A, B, C are densely populated, and (ii) why the areas marked Y and Z are sparsely populated. (*b*) What are the factors which determine the area Y and the *southern* boundary of area Z? (*N.*)

8. Meat is canned at Chicago, fruits are canned in the Californian Valley, and fish is canned in British Columbia. Explain with the help of sketch maps (*a*) the advantage each area possesses for the industry named; (*b*) why the raw materials are so treated. (*N.*)

9. Bananas are exported from Jamaica, oil from the Oklahoma—Kansas field, salmon from the lower Fraser River, raisins from California.

(*a*) On a map of North America: (i) shade the exact location of each of these areas; (ii) mark and name *one* important port for each commodity.

(*b*) Select any *two* of these products and describe how each is obtained and prepared for market. (*N.*)

10. (*a*) On a map of North America, show the usual trading routes between (i) Havana and San Francisco; (ii) Edmonton and Vancouver; (iii) Port Arthur (Lake Superior) and Montreal.

(*b*) Select one bulk product sent along the trading route from the first town in each pair and describe the special local advantages relating to that product. (*N.*)

11. Draw sketch maps to illustrate any two of the following features of North American Geography: (*a*) the Valley of California; (*b*) three different routes by which wheat is conveyed from Saskatchewan to ports of export; (*c*) the Great Crop Belts of the Mississippi Basin; (*d*) the fishing grounds

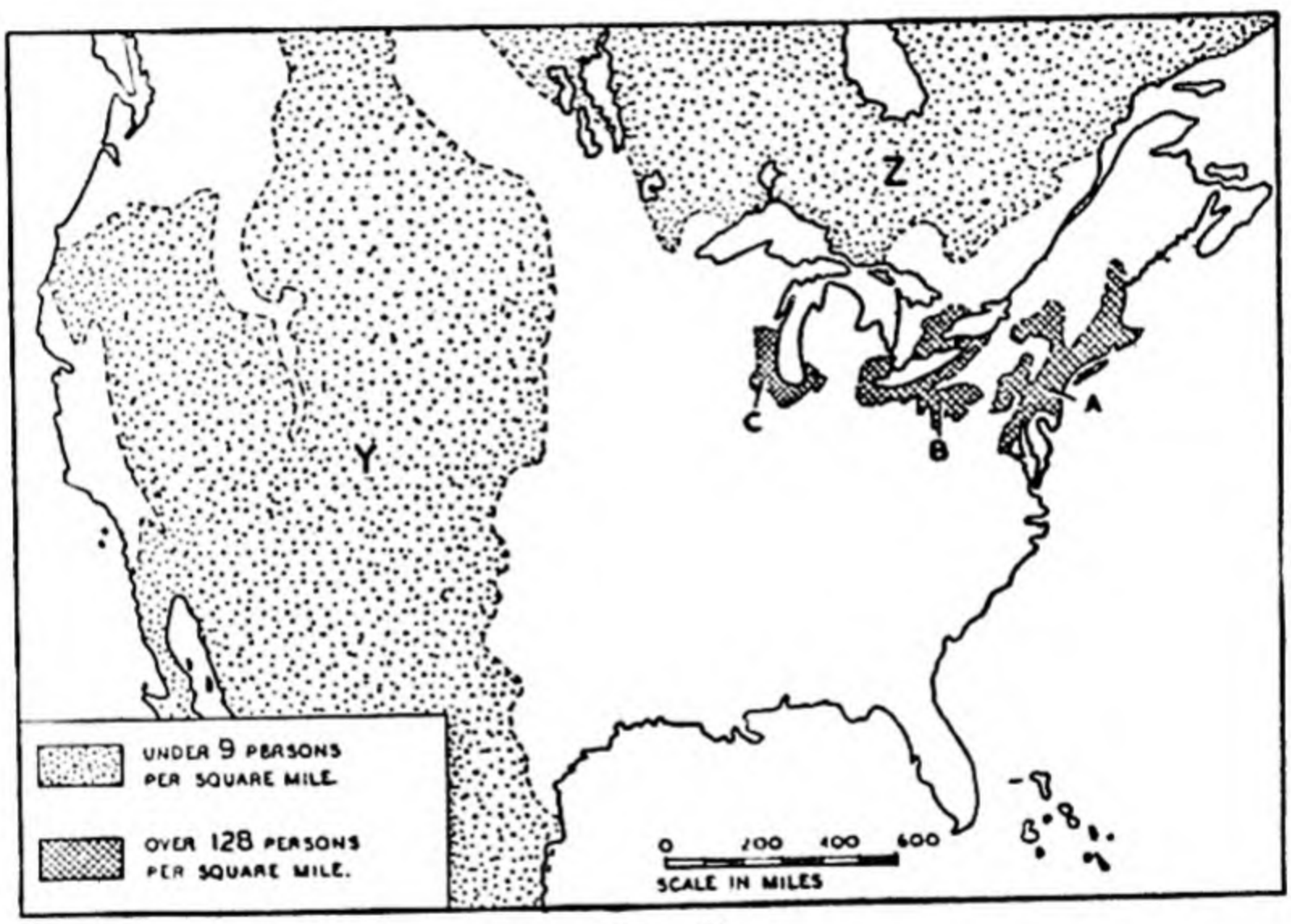


Fig. 53.

and fishing ports of north-east North America; (*e*) the Great Lakes and St Lawrence system showing the chief obstructions to navigation and the canals which surmount them. (*N.*)

12. Compare broadly the unshaded areas marked A and B on the map of the United States (Fig. 54) with regard to (*a*) relief; (*b*) mean annual rainfall; (*c*) agriculture; (*d*) *either* resources in coal *or* density of population. (*N.*)

13. (*a*) On a map of North America showing chief rivers and lakes, shade and name: (i) the Canadian Shield; (ii) Florida; (iii) Valley of California; (iv) the Lake Peninsula of Ontario; (v) the New England States; (vi) the Pittsburgh industrial area. Then answer two of the three questions (*b*) (i), (ii), (iii).

(*b*) (i) Describe the scenery and natural vegetation of either the Canadian Shield or Florida.

(ii) Discuss the characteristic farming either in the Californian Valley or the Lake Peninsula of Ontario.

(iii) Discuss the characteristic industrial activities of either New England or the Pittsburgh industrial area.

14. (*a*) Show on a sketch map the approximate position of the cotton-growing belt and three cotton exporting ports of the United States.

(*b*) State *four* geographical conditions favouring cotton growing in the area marked on your map.

(*c*) Name *two* areas in the U.S.A. important for cotton manufacture.

(*d*) State *three* advantages and/or disadvantages for cotton manufacturing in *one* of these areas. (*N.*)

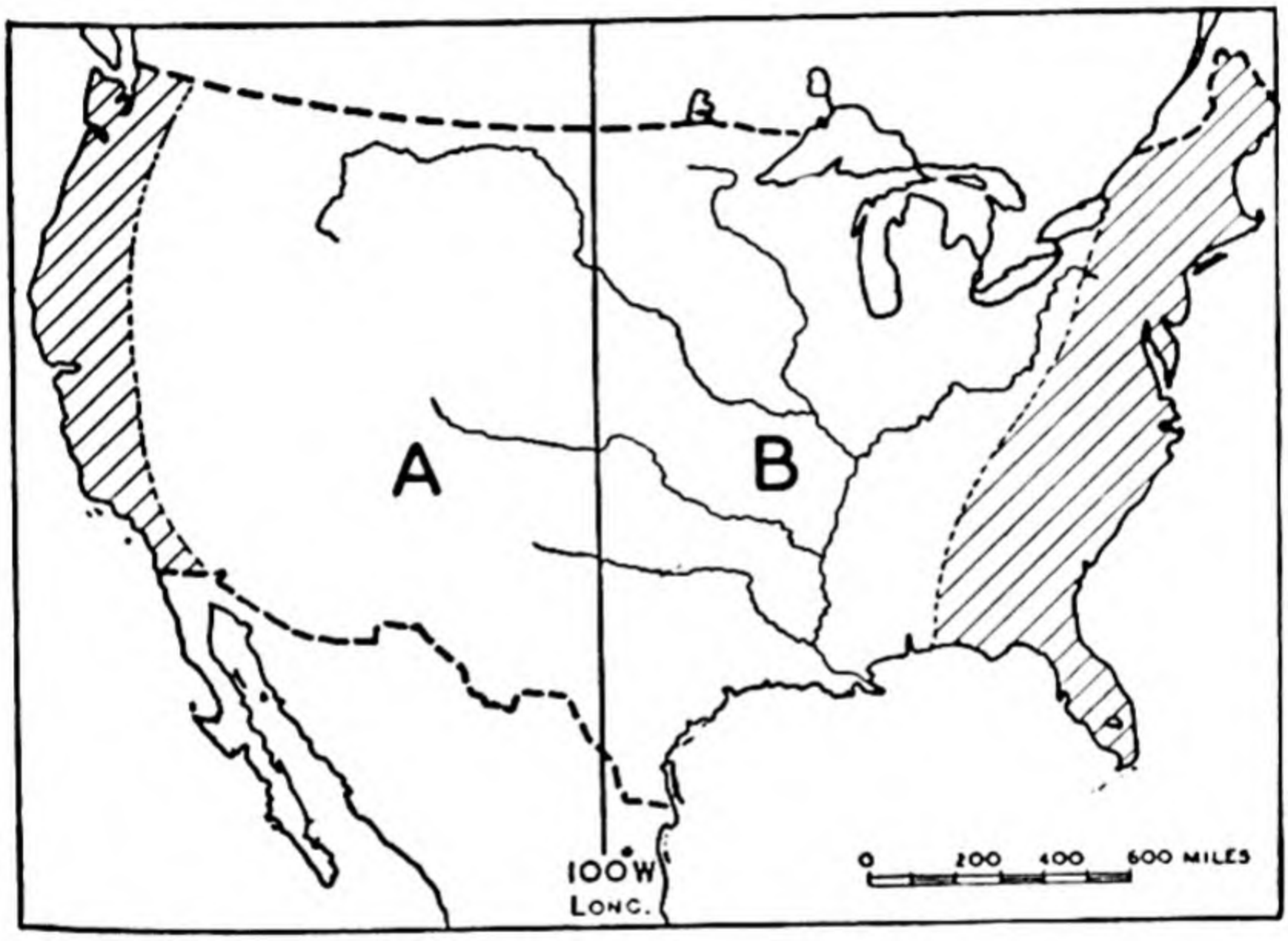


Fig. 54.

15. Explain where in North America and under what geographical conditions wheat is cultivated on a large scale. (*L.*)

16. Choose *three* examples of North American rivers or lakes which have been made useful to man. For *each*, describe the improvements which have been made and then the consequences. Illustrate your answer. (*O.*)

17. In what ways, and for what reasons, does the character of the agriculture differ in the Atlantic Provinces and the Prairies of Canada? (*O.*)

18. With the help of a sketch map, briefly describe the types of country you would traverse on the Canadian Pacific Railway between Montreal and Vancouver. (*L.*)

19. Select *three* ports in Eastern Canada and state their advantages and disadvantages for conducting Canadian trade. Illustrate your answer by a sketch map for each port. (*O.*)

20. Select iron mining, *or* ranching, *or* fishing. Specify the North American areas of its large-scale activity. For each of these specified areas state *three* factors which make possible large-scale production. Insert on a sketch map the location, with names of places mentioned in the written answer. (*O.*)

21. Draw sketch maps to give details, including relief and routes, of *two* of the following:—

(*a*) The St Lawrence Valley.

(*b*) The Hudson-Mohawk Gap.

(*c*) Winnipeg as the gateway between east and west Canada. (*C.*)

22. Show by means of a sketch map the position and extent of the Canadian Shield. Describe briefly the characteristic features of its surface. Explain *two* ways in which this area is of value to Canada. (*C.*)

23. Locate the Great Salt Lake region and any *one* other desert region in the U.S.A. where farming is entirely dependent upon irrigation. In the case of each area, describe the conditions which make irrigation possible and give some account of the agricultural activities. (*O. & C.*)

24. In which part of the U.S.A. is each of the following a leading crop: (*a*) maize, (*b*) cotton?

Describe the physical, climatic, and other geographical factors which favour the large-scale production of these crops in the areas you have indicated. (*O. & C.*)

25. Describe *either* the iron and steel industry *or* the cotton textile industry of the U.S.A. under the headings (*a*) positions of the main centres of manufacture, (*b*) sources of raw materials and power, (*c*) transport facilities. (*L.*)

26. Give reasons which help to explain *three* of the following statements:—

(*a*) There is a concentration of railway routes on Winnipeg.

(*b*) Chicago is an important centre for the meat-packing industry.

(*c*) Montreal is the largest city in Canada.

(*d*) Boston is an important seaport.

Illustrate your answer by sketch maps. (*L.*)

27. Describe with the aid of a sketch map the geographical factors which have contributed to the distribution of population in either Ontario *or* New England. (*L.*)

28. Draw a sketch map of the Atlantic coastlands backed by the Appalachians south of the latitude of the Hudson River. Insert and name the Potomac, *three* Fall-Line towns, and three seaports. Against each of the six towns write, in addition to its name, F for Fall-Line town or S for seaport. Describe and explain the agriculture of the south and the industries of the north of the area. (*O.*)

29. State and account for the climatic facts which are illustrated by the following statistics: —

	Lat.	*Alt.*	*Temperature*		*Rainfall (in.)*	
	° N.	*(ft)*	*Mean January*	*Mean July*	*Mean Total*	*Av. Amount May-Oct.*
Halifax	45	82	−4° C. (24° F.)	18° C. (65° F.)	57·3	25·5
Charleston (S.C.)	33	48	9° C. (49° F.)	27° C. (81° F.)	48·6	30·7
Winnipeg	50	1492	−19° C. (−3° F.)	19° C. (66° F.)	20·7	14·2

(C)

INDEX

5239

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